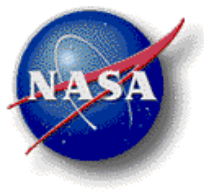


Section C

Aircraft Maintenance, Logistics, Integration, Configuration Management and Engineering Statement of Work (SOW)

Flight Operations Directorate
Aircraft Operations Division

Solicitation # NNJ16556087R



National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058

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Preface

During the period of performance of the Aircraft maintenance, Logistics, Integration, Configuration management, and Engineering (ALICE) contract, National Aeronautics and Space Administration (NASA) aircraft operations will support the International Space Station Program, the Orion Program, NASA Commercial Crew, airborne science, aeronautics research, and other new NASA missions. The Contractor will maintain a dynamic and creative workforce in order to adapt quickly to the evolving NASA mission.

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1.0 Introduction

1.1 Overview

This Statement of Work (SOW) describes the work to be performed, services required, and the deliverables to be provided by the Contractor under the Aircraft maintenance, Logistics, Integration, Configuration management, and Engineering (ALICE) contract. The Government will have overall authority and will provide priorities and direction for all work contained within this SOW. The Contractor shall:

- a. Manage its workforce to ensure the daily priorities and technical direction provided by the Government are met to ensure quality products and safe services are provided to NASA and NASA customers for the life of this contract.
- b. Provide support to Government-led initiatives, new capability development, and other non-mission specific programmatic support tasks.
- c. Provide support to all AOD stakeholders for Government-led mission preparation, training and execution.

1.2 Requirements Definition

The following definitions differentiate between requirements and other statements contained in this statement of work:

Shall	This is the only verb used for binding requirements.
Should/May	These verbs are used for stating non-mandatory goals.
Will	This verb is used for stating facts or declaration of purpose.

1.3 Background

1.3.1 Johnson Space Center

Located in Houston, Texas, Ellington Field, shown in Figure 1-1, was built in 1917 to train pilots for combat in the First World War. Since then, the airfield has functioned in a variety of operational roles; as an active duty base, an Air Force Reserve base, and an Air National Guard base. Since 1962, Ellington Field has been the home for all NASA Johnson Space Center (JSC) astronaut flight training. In 1984, the city of Houston purchased Ellington Field and the airfield remains active today serving NASA, military, commercial, and general aviation needs.

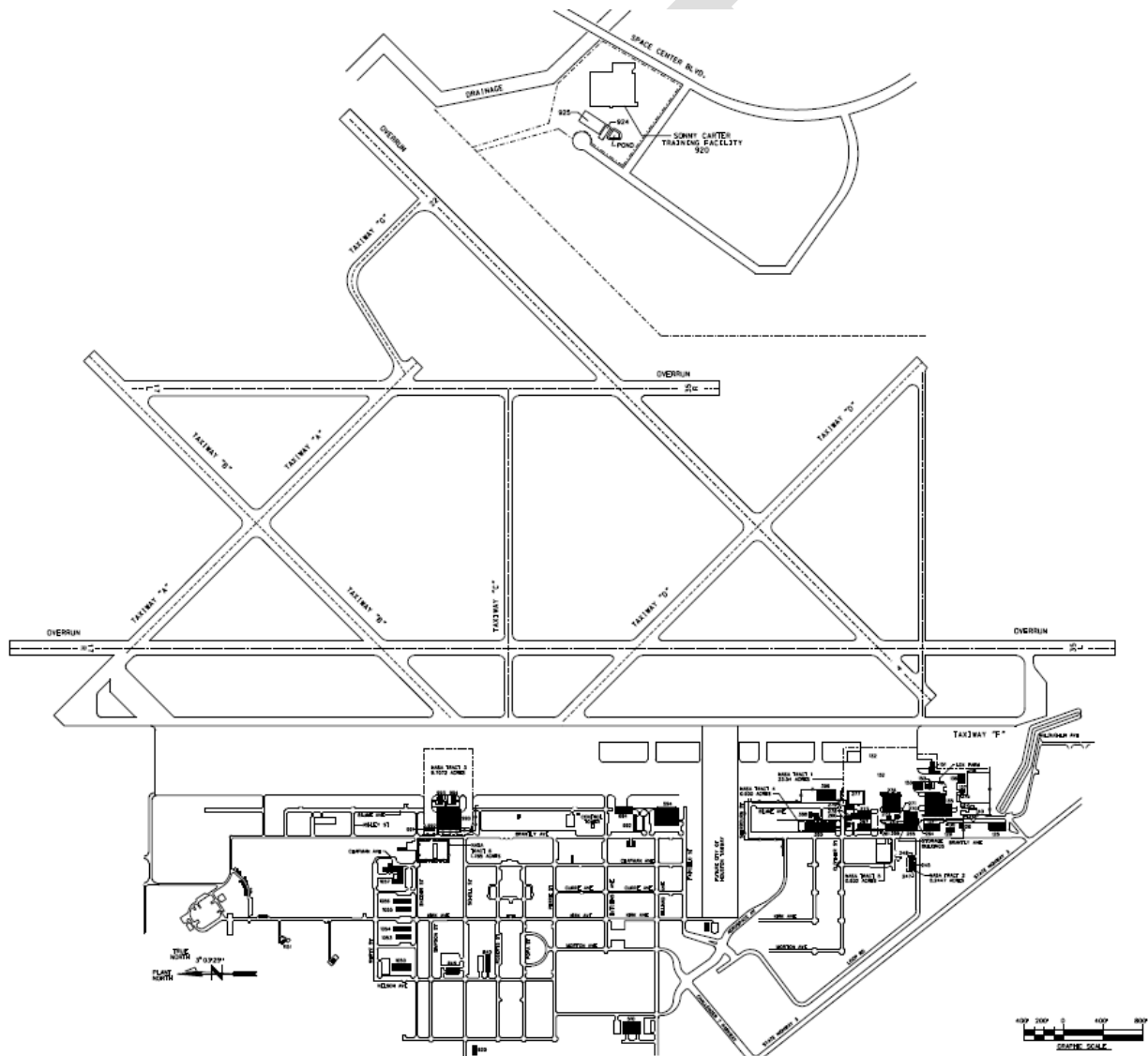


Figure 1-1: Ellington Field

1.3.1.1 JSC Managed Facilities¹

The facilities and shops listed in Table 1-1 and Table 1-2 are managed by the Johnson Space Center (JSC):

Table 1-1: Ellington Field (EFD) Facilities

Shop or Facility	Location and Building	Remarks
Administration Office	EFD, Building 273	NASA QA, IT, Contractor Administration
Aircraft Test Article Facility	EFD, Building 142	
Battery Shop	EFD, Building 135	
Corrosion/Paint Shop	EFD, Building 136	
Egress Shop	EFD, Building 271	Maintain T-38/WB-57 pyrotechnics for egress systems
Electric Shop	EFD, Building 135	
Electronics Lab	EFD, Building 135	
Engine Shop	EFD, Building 135	
Engineering	EFD, Building 135	
Flight Line/Ramp	EFD, ELP	
Fuel Cell Maintenance	EFD, Building 150	
Ground Support Equipment Shop	EFD, Building 278	
Hangar 135	EFD, Building 135	G-III, Maintenance, QC/QA, Engineering
Hangar/Docks 276	EFD, Building 276	T-38 Maintenance
Hangar 990	EFD, Building 990	WB-57F Maintenance, and WB-57 Program Office
Hydraulic/Pneumatic Shop	EFD, Building 276	
Heat Treat	EFD, Building 142	
Jet Engine Test Facility	EFD, Building 140	
Mechanical Accessories Shop	EFD, Building 272	
NASA Division Office, Flight Operations and Safety Office	EFD, Building 276	
Nondestructive Inspection (NDI) Testing Lab	EFD, Building 150	
Personal Equipment Shop	EFD, Building 276	Maintain aircrew pyrotechnics
Pressure Suit Shop	EFD, Building 990	
Maintenance and Production Control	EFD, Building 276	
Quality Offices, Documentation and Data Management	EFD, Building 267	NASA Government Quality Assurance (QA), Contractor Quality Control (QC)

¹ Facilities may change during the course of the contract.

Shop or Facility	Location and Building	Remarks
Sound Suppression Facility	EFD, Building 151	
Sheet Metal Shop	EFD, Building 135	
Supply Building 333	JSC Site, Building 333—Partial Use/Shared with other NASA Contractors	
Supply Building 338	JSC Site, Building 338—Partial Use/Shared with other NASA Contractors	
Supply Building 993	EFD, Building 993	
Supply Building 994	EFD, Building 994 (WB-57 Special Projects)	
Supply- Class B And C Explosives	EFD, Building E270	Storage for pyrotechnics
T-38 Simulator	JSC Site, Building 5	
Tire and Wheel Shop	EFD, Building 137	
Tire and Wheel Storage	EFD, Building 137B	
Warehouse, Building 265	EFD, Building 265	Storage for pyrotechnics
Warehouse, Building 266	EFD, Building 266	
Warehouse, Building 270	EFD, Building 270	
Warehouse, Building 380	EFD, Building 380	
Welding Shop	EFD, Building 279	
Aircraft Wash Rack	EFD, Building 280	

Table 1-2: El Paso (ELP) Facilities²

Shop or Facility	Location and Building	Remarks
Hangar 1	ELP, Building 8101	T-38, G-III, and 377 Super Guppy Maintenance
GSE Shop	ELP, 8101B Boeing	Ground power scheduled and unscheduled maintenance
Quality	ELP, 8101C Boeing	Quality Manager and Production Inspectors/DSI
Hangar 2	ELP, Building 8201	T-38 Maintenance (depot)

² See SOW Subsection 7.5 regarding El Paso depot requirements.

1.3.1.2 JSC Assigned Aircraft

Aircraft currently assigned to JSC are shown in Table 1-3.

Table 1-3: JSC Aircraft and Engine Assignments³

Qty	Type Aircraft	Mission	Type Engine	Location
20 ⁴	Northrop T-38N	Space Flight Readiness Training	General Electric J-85-5	JSC, Houston, Texas (Ellington Field)
3	General Dynamics WB-57F	Program Support Aircraft, Life Science	Pratt and Whitney TF-33-P11	JSC, Houston, Texas (Ellington Field)
1	B377 SGT Super Guppy	Program Support Aircraft, Life Sciences	Allison 501-D22C	El Paso, Texas
1	Gulfstream G-III	Program Support, Mission Management Aircraft, Airborne Science	Rolls Royce Spey MK511-8	JSC, Houston, Texas (Ellington Field)

³ JSC may add or remove aircraft during the contract period of performance. The added or removed aircraft may be the same aircraft types shown in Table 1-3 or different aircraft types.

⁴ There are currently Qty:18 Operational T-38 aircraft and Qty:2 in flyable storage.

1.3.1.2.1 Northrop T-38N

The T-38A “Talon” is a two-place, twin turbojet, swept-wing, supersonic aircraft designed for the United States Air Force as a high performance trainer. NASA currently uses a modified version of the Air Force T-38A aircraft designated the T-38N shown in Figure 1-2. The T-38N is used for astronaut space flight readiness training, and is fully aerobatic although provisions for anti-g suit have been removed



Figure 1-2: Northrop T-38N

1.3.1.2.2 General Dynamics WB-57

The WB-57, shown in Figure 1-3, is a mid-wing, long range aircraft capable of operation for extended periods of time from sea level to altitudes well in excess of 60,000 feet. The WB-57 can fly for approximately 6.5 hours and has a range of approximately 2,600 miles. The WB-57 can carry up to 8,800 pounds of payload. Two crewmembers are positioned at separate tandem locations with the pilot sitting in the front and sensor equipment operator sitting in the rear.



Figure 1-3: General Dynamics WB-57

1.3.1.2.3 Airbus Industries Super Guppy Transport

The Super Guppy Transport (SGT) aircraft, shown in Figure 1-4, was acquired by NASA from the European Space Agency and was manufactured by Airbus Industries in 1983. The SGT is the latest version in a long line of Guppy cargo aircraft used by NASA, and is designed to transport oversized cargo.

The SGT, also designated 377SGT-F, has a cargo compartment that is 25 feet tall, 25 feet wide and 111 feet long. The aircraft has a unique hinged nose that can open more than 100 degrees, allowing large pieces of cargo to be loaded and unloaded from the front. The maximum takeoff weight is 170,000 pounds and maximum range is 1,730 nautical miles.



Figure 1-4: Airbus Industries Super Guppy

1.3.1.2.4 Gulfstream III – Mission Management Aircraft

The Gulfstream III, shown in Figure 1-5, was built by Gulfstream Aerospace Corp. In its commercial versions, the G-III's basic role is that of an executive business aircraft that can carry up to 15 passengers.

The G-III's maximum takeoff weight with full fuel and passengers/cargo is 69,700 pounds. Empty, the unmodified airplane weighs about 38,000 pounds. The aircraft has a wingspan of just over 77 feet, is about 83 feet long and just over 24 feet tall. Normal cruise for the aircraft is 459 knots, and its top speed is 501 knots (Mach 0.85). Its maximum operating altitude is 45,000 feet. The Gulfstream-III has a range with a full load of passengers or equipment of about 2,800 nautical miles.



Figure 1-5: Gulfstream GIII

1.3.1.2.5 T-38N Simulator

The T-38N simulator, shown in Figure 1-6 and Figure 1-7, is ground based (no motion) and is located on-site at Johnson Space Center in Building 5. The simulator is configured with a cockpit taken from a NASA T-38 aircraft and modified to meet simulator training requirements.

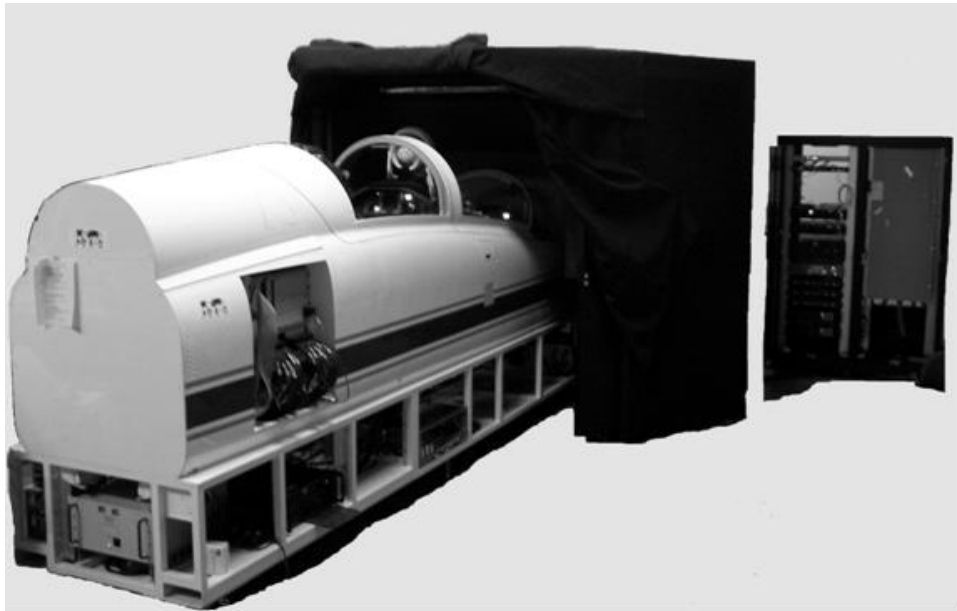


Figure 1-6: T-38N Simulator



Figure 1-7: T-38N Simulator, Cockpit View

1.3.2 Langley Research Center

Langley Research Center (LaRC) is the oldest of NASA's field centers. Located in Hampton, Virginia, Langley was established in 1917 by the National Advisory Committee for Aeronautics. Langley focuses primarily on aeronautics research although a number of space missions have been designed at the Center. Langley currently has more than forty wind tunnels performing research on improving aircraft and spacecraft safety, performance, and efficiency. Today, two-thirds of Langley's programs involve aeronautics research and the rest concentrate on space research. See Figure 1-8.

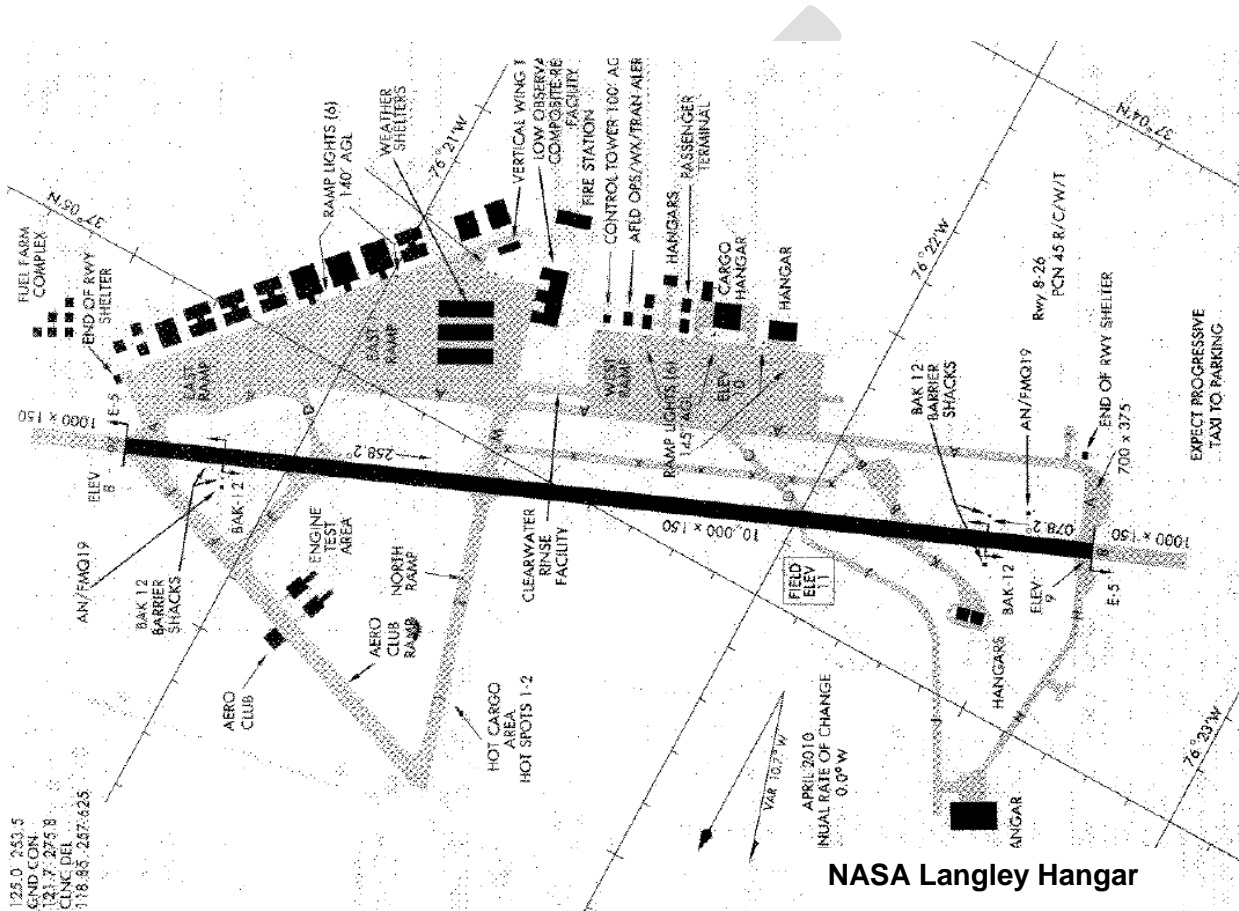


Figure 1-8: Langley Research Center

1.3.2.1 LaRC Managed Facilities

The facilities and shops listed in Table 1-4 are managed by the Langley Research Center (LaRC).

Table 1-4: LaRC Facilities

Shop/Facility	Location/Building	Remarks
Administration Office	LaRC Building 1244	NASA Maintenance, Contract Administration
Battery Shop	LaRC Building 1244	
Electric Shop	LaRC Building 1244	
Fabrication Shop	LaRC Building 1244	
Flight Line/Ramp	LaRC	
Ground Support Equipment Shop	LaRC Building 1244	
Personnel Equipment Shop	LaRC Building 1244	
Quality Assurance Office	LaRC Building 1244	
Supply	LaRC Building 1244	

1.3.2.2 LaRC Assigned Aircraft

Aircraft currently assigned to LaRC are shown in Table 1-5.⁵

Table 1-5: LaRC Aircraft and Engine Assignments

Qty	Type Aircraft	Mission	Type Engine	Location
1	Beechcraft King Air B200	Program Support Aircraft	Pratt & Whitney PT6A-42	LaRC
1	Beechcraft UC-12B Huron	Research Aircraft	Pratt & Whitney PT6A-42	LaRC
1	Cessna 206	Research and Development Aircraft	Lycoming IO-540-AC1A	LaRC
1	Cirrus SR-22	Research and Development Aircraft	Continental IO-550	LaRC
1	Bell UH-1H (in flyable storage)	Program Support Aircraft	Lycoming T-53-L-13B	LaRC
1	Lancair Columbia LC-40 (in flyable storage)	Program Support Aircraft	Continental IO-550	LaRC
1	North American Rockwell OV-10A (in flyable storage)	Research and Development Aircraft	Garrett-AiResearch T-76	LaRC
2	North American Rockwell OV-10G (in flyable storage)	Research and Development Aircraft	Garrett-AiResearch T-76	LaRC

⁵ LaRC may add or remove aircraft during the contract period of performance. The added or removed aircraft may be the same aircraft types shown in Table 1-5 or different aircraft types.

1.3.2.2.1 Beechcraft B200 King Air and UC-12B Huron

The NASA-Langley B200 King Air (NASA 529) and UC-12B Huron, shown in Figure 1-9, are turbine, twin-engine research aircraft. Pressurized for flight above 30,000 ft., their fuel endurance can take them halfway across the United States. The aircraft are fully IFR capable. These aircraft are excellent platform aircraft for low-medium altitude programs.



Figure 1-9: Beechcraft B200 King Air and UC-12B Huron

1.3.2.2.2 Cessna 206H Stationair

The Cessna 206H Stationair, shown in Figure 1-10, is an all-metal, six place, high-wing, single-engine airplane equipped with tricycle landing gear and is designed for general utility purposes. The Model 206H is certified to the requirements of U.S. FAA Federal Aviation Regulation Part 23, including day, night, Visual Flight Rule VFR and Instrument Flight Rule IFR. The aircraft has been reconfigured to accommodate a crew of three: a subject pilot, a safety pilot, and a researcher. The subject pilot may sit in either of the two front seats as required by the experiment. The researcher sits in the right aft seat at a researcher workstation.



Figure 1-10: Cessna 206H Stationair

1.3.2.2.3 Cirrus SR22

The Cirrus SR22, shown in Figure 1-11, is a composite construction, single-engine, four-place production general aviation (GA) aircraft manufactured by Cirrus Design of Duluth, Minnesota. The SR22 is one of several new-generation GA aircraft making use of the latest in materials, aerodynamics, avionics, and manufacturing technology. The SR22 aircraft received Federal Aviation Administration (FAA) certification in 2000, with over 600 aircraft having been delivered since that time. One of the innovative design features of the SR22 aircraft is the Cirrus Airframe Parachute System (CAPS). The CAPS is an emergency parachute system that can be deployed by the pilot or a passenger to safely slow and lower the entire airplane to ground if controlled flight is no longer possible.



Figure 1-11: Cirrus SR22

1.3.2.2.4 Huey UH-1H

The Huey UH-1H helicopter (N535NA), shown in Figure 1-12, is an established, turbine-driven, rotary-wing flight platform. The aircraft is primarily a research and aerial photography asset, although it also serves well in airborne surveillance and installation security. The cockpit contains dual flight controls and a minimal avionics suite consisting of VHF Omni-directional Range (VOR) and distance measuring equipment (DME). A mount also exists for a handheld Global Positioning System (GPS). No established research pallet position exists in the spacious rear cargo compartment, which is currently configured to carry 11 passengers. Though the cargo compartment is ideal for platform installation, most research applications were historically mounted beneath the aircraft. This configuration is possible due to the aircraft's high-skid configuration, allowing an extra 1.7 feet of clearance between the ground and the aircraft underbelly.



Figure 1-12: Huey UH-1H

1.3.2.2.5 Lancair Columbia LC-40

The Lancair Columbia LC-40 (N507NA), shown in Figure 1-13, is an established, reciprocating, single-engine, fixed-wing flight platform. The aircraft is primarily a research asset. The cockpit contains dual flight controls and an adequate avionics suite consisting of VOR/Instrument Landing System (ILS) and a GPS. The rear compartment contains one equipment operator seat and a research equipment position that extends back into the small cargo compartment.



Figure 1-13: Lancair Columbia LC-40

1.3.2.2.6 North American Rockwell OV-10A/G

The North American Rockwell OV-10A/G aircraft (N524NA), shown in Figure 1-14, is a former USAF aircraft designed for stable operation and high maneuverability. It is a twin turboprop aircraft, which can be configured with externally-mounted stores or research pods.

Additionally, it has a large internal bay available for equipment installation. The aircraft is configured with tandem seating for a pilot and observer/researcher. The front cockpit contains full flight, engine, and radio operational controls. The rear cockpit contains basic flight controls and limited engine and landing-gear controls. Both cockpits are equipped with ejection seats.



Figure 1-14: North American Rockwell OV-10A/G

2.0 Scope

2.1 Overview

The scope of the ALICE contract is to provide and support:

- 1) Aircraft maintenance, logistics, engineering, and operational support
- 2) Space flight readiness training
- 3) Airborne research and development
- 4) Charter/contracted aircraft services
- 5) Other activities as designated by the Government

2.2 Support Locations

2.2.1 Johnson Space Center (JSC) Managed Locations

The Contractor shall provide aircraft maintenance, logistics, engineering, and operational support at the following JSC managed locations:⁶

- 1) Johnson Space Center, at Ellington Field (EFD), Houston, Texas
- 2) Forward Operating Location (FOL) at El Paso (ELP), Texas
- 3) Other locations as required within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS).⁷

⁶ NASA may add or remove other NASA centers or FOLs during the contract period of performance to meet NASA mission demands.

⁷ The Contractor may be required to provide support at other Government or contractor facilities based on NASA mission requirements.

2.2.2 Langley Research Center (LaRC) Managed Locations

The Contractor shall provide aircraft maintenance and operational support at the following LaRC managed locations:⁶

- 1) Langley Research Center, Hampton, Virginia⁸
- 2) Other locations as required within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS).⁹

2.3 NASA Center Unique Differences

The format of this statement of work (SOW) reflects JSC as the primary customer. Any unique requirements for work at other NASA centers (e.g. NASA Langley Research Center) are included at the end of each SOW section and titled “Center Unique.” When included, these Center unique requirements shall take precedence over JSC’s requirements at that Center. If Center unique requirements are not included, then the JSC requirements shall apply to the other NASA Center(s). If the center unique requirement is marked as “not applicable” then there is no unique nor JSC requirement that applies.

⁸ See SOW Subsection 2.3 regarding SOW content and NASA Langley Center unique differences.

⁹ The Contractor may be required to provide support at other Government or contractor facilities based on NASA mission requirements.

3.0 References and Applicable Documents

3.1 Order of Precedence

In the event of a conflict between a NASA document cited in this statement of work and a non-NASA document cited herein, the NASA document shall take precedence.

3.2 Acronyms

See Appendix A.

3.3 Definitions

See Appendix B.

3.4 Personnel Requirements

See Appendix C.

4.0 Contract Management

4.1 General Requirements

4.1.1 Overview

The Government will have overall authority and will provide priorities and direction for all work contained within this SOW. The Contractor shall support the Government to ensure the performance requirements contained within this SOW are met. The Contractor shall perform in accordance with:

- a. NPR 7900.3, *Aircraft Operations Management*
- b. NPD 7900.4, *NASA Aircraft Operations Management*
- c. AOD 34100, *Aircraft Maintenance Manual*

4.1.2 Customer Focus

Contractor personnel will be required to interact with NASA personnel and other NASA customers including Government agencies and commercial entities. The Contractor shall ensure all personnel act in accordance with NW-2014-03-005-JSC, *JSC Expected Behaviors*.

4.1.3 Contractor Information Program

The Contractor shall disseminate information to all personnel concerning issues of health, environmental, safety practices, and aircraft safety of flight items.

4.1.4 Normal Hours of Operation¹⁰

The Government will establish work hours consistent with meeting the mission at each contract location. The Contractor shall provide personnel for varied work schedules to meet changing mission requirements.

4.1.4.1 JSC Ellington Field

Typical work hours for JSC Ellington Field are:

2:30 PM to 11:45 PM (local time)	Sunday
6:30 AM to 11:45 PM (local time)	Monday – Thursday
6:30 AM to 3:15 PM (local time)	Friday

4.1.4.2 El Paso FOL

Typical work hours for the El Paso FOL are:

6:15 AM to 5:00 PM (local time)	Monday – Thursday (T-38 Depot)
6:15 AM to 3:15 PM (local time)	Monday – Friday (Super Guppy)

4.2 Management

4.2.1 Management Approach

The Contractor shall provide an efficient and aggressively cost effective management approach consistent with a full understanding of the Contractor/Government relationship. The Contractor shall implement the appropriate structure, processes, planning, organization, controls, and reporting required to ensure the management, technical, performance, scheduling, and cost objective requirements stipulated within this contract are accomplished in a safe and efficient manner.

4.2.2 Executive Manager

The Contractor shall provide a full-time Executive Manager located at Ellington Field to oversee all work performed in this statement of work. The Contractor shall provide an alternate Executive Manager if the primary is unavailable for duty. The Executive Manager or alternate shall:

- 1) Serve as the single-point-of-contact for all ALICE contract activities.
- 2) Have full authority to act for the Contractor on all matters relating to this contract.
- 3) Respond to NASA CO and COR requests within the specified period established at time of request.
- 4) Be available during normal JSC hours of operation (see SOW Subsection 4.1.4) within one (1) hour to meet at Ellington Field with NASA personnel. After normal JSC hours of operation, the

¹⁰ Normal hours of operation may be revised by the Government over the duration of the contract.

Executive Manager or alternate shall be available within two (2) hours after being contacted by NASA to meet at Ellington Field.

- 5) The Executive Manager will typically meet with the AOD Chief, Deputy Chief, and COR on a bi-weekly basis to discuss items of interest.

4.2.3 Management Team

The Contractor shall provide the necessary management services to support the requirements of the contract.

4.2.4 Financial Management

The Contractor shall provide financial management services (e.g. accounting and budgeting) in support of the contract.

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4.2.5 Management and Planning Reports

The Contractor shall provide general management, planning, budgeting, Data Requirements Descriptions (DRDs), and other reports as requested by the Government.

4.2.5.1 Deliverables – Management

The Contractor shall provide the management deliverables listed in Table 4-1.

Table 4-1: Data Requirement Description (DRD)- Management¹¹

Data Requirement List (DRL) Item No.	DRD Title
DRD-M01	Management Plan
DRD-M02	Commercial Procurement Status Report
DRD-M03	Contractor Work Breakdown Structure (WBS) and Dictionary
DRD-M04	Monthly Progress Reports
DRD-M05	NF533 Cost Reporting
DRD-M06	Notification of Potential Labor Dispute and Contingency Strike Plan
DRD-M07	Roster of Contract Personnel
DRD-M08	Labor Relations Plan
DRD-M09	Wage/Salary and Fringe Benefit Data
DRD-M10	Reprocurement Data Package
DRD-M11	Training and Certification Plan
DRD-M12	Environmental and Energy Consuming Product Compliance Reports
DRD-M13	Contract Phase-In Plan
DRD-M14	Information Technology (IT) Capital Planning and Investment Control (CPIC)
DRD-M15	Total Compensation Plan
DRD-M16	Supplemental Project Cost Reporting
DRD-M17	Key Personnel
DRD-M18	Contractor's Operating Manual
DRD-M19	Information Technology (IT) Security Plan, Risk Assessment
DRD-M20	Organizational Conflict of Interest Mitigation Plan

¹¹ Refer to Section J, Attachment J-1 for DRD requirements.

4.3 Administrative Support

The Contractor shall provide the necessary administrative services to support requirements of the contract.

4.4 Human Resources

4.4.1 General Requirements¹²

The Contractor shall:

- 1) Provide fully trained, qualified, and certified (if required) Contractor personnel in sufficient numbers to manage, supervise, and perform work under this contract. The Contractor's workforce shall meet the personnel requirements listed in Appendix C.
- 2) Ensure no mission impacts due to position vacancies or personnel qualifications.

4.4.2 Personal Attire and Appearance

The Contractor shall ensure that the workforce meets the following personal attire and appearance requirements:

- 1) Contractor personnel shall not wear jewelry or other forms of attire that, if lost, could constitute a Foreign Object Debris (FOD) or safety hazard, in and around aircraft or aircraft related equipment.
- 2) Contractor personnel shall wear NASA identification badges except when in the vicinity of aircraft or around mechanical equipment where they could be considered a safety or FOD hazard.
- 3) Technicians, full-time quality inspectors, and first line maintenance supervisors shall be easily identified as a Contractor employee, by technical function. They shall wear uniforms that incorporate a corporate name or logo and clearly depict the employee's first and last name.

4.4.3 Physicals

The Contractor shall ensure personnel obtain Government provided physical examinations and physiological training in accordance with JPR 1700.1, *JSC Safety and Health Handbook*, NPR 7900.3, *Aircraft Operations Management*, and other applicable regulations governing the work task.

¹² NASA may restrict the access of any employee, or prospective employee, identified as a potential threat to the health, safety, security, or operational mission of the installation and its personnel.

4.4.4 Security Clearances

The Contractor shall:

- 1) Provide personnel with security clearances up to SECRET based on specific program requirements.
- 2) When identified by the government, all personnel assigned to support payload development, integration, operations, deployments, and other aircraft activities shall have a SECRET or higher security clearance based on mission requirements.

4.4.5 Surge Requirements

The Contractor shall support surge demands in staffing or workloads dictated by missions, operations, or maintenance demands. Examples include:

- 1) Adding multiple shifts
- 2) Adjusting shifts
- 3) Part time/temporary personnel

4.5 Training¹³

4.5.1 Training – Safety and Health

The Contractor shall provide safety and health training to meet the requirements in NASA JPR 1700.1, *JSC Safety and Health Handbook*, and DRD requirements listed in Table 4-1 for all employees based on job assignment within ninety (90) calendar days of employment and anytime an employee is reassigned to new tasks that require additional safety training.

¹³ The Government will approve the Contractor's training plan and add additional training as required.

4.5.2 Training – Government Provided

NASA will provide job specific training classes. The Contractor shall provide personnel to attend these classes. The Contractor shall provide NASA with a list of proposed attendees to attend the classes below. The Government will approve the attendees prior to training.¹⁴ Examples of Government provided training include:

- 1) NASA Aircraft Management Information System (NAMIS) user's and database administrator training¹⁵
- 2) Computer security training in accordance with the Office of Management and Budget Circular A-130, Appendix III, *Security of Federal Automated Information Resources* within three (3) months of employment and annually thereafter
- 3) Electrostatic discharge training in accordance with NASA JPR 8730.1, *Electrostatic Discharge Control Requirements for the Protection of Electronic Components and Assemblies*
- 4) Soldered electrical connections training in accordance with the Institute for Printed Circuits (IPC) J-STD-001F, Requirements for Soldered Electrical and Electronic Assemblies
- 5) Crimping and wire harness training in accordance with NASA-STD-8739.4, *Crimping, Interconnecting, Cables, Harnesses, and Wiring*
- 6) WB-57 pressure suit technician training
- 7) Taxi authorization for G-III
- 8) Aircrew emergency egress
- 9) Aircrew training specific to NASA aircraft or unique on-board systems for:
 - a. Pilots
 - b. Flight Engineers
 - c. Load Masters
 - d. Sensor Equipment Operators
- 10) Other classes as required

¹⁴ Class size or job requirements may restrict or limit the number of approved attendees.

¹⁵ NASA will provide initial NAMIS training for the Contractor. The Contractor shall provide NAMIS training for all Contractor personnel no later than six (6) months after contract start.

4.5.3 Training – Critical Task

The Contractor shall provide the following training identified by NASA as critical task training. Personnel trained to accomplish critical tasks shall be recertified on an annual basis or as stipulated in applicable Department of Defense (DoD), NASA, and original equipment manufacturer (OEM) documents.¹⁶

- 1) T-38 and WB-57 ejection seats and seat kits (certified via Contractor certification plan based on approved technical data).
- 2) T-38 and WB-57 canopy rigging (Contractor certified based on approved technical data).
- 3) Engine run certifications by type, model, series engine, both low power and high power (Contractor certified based on approved technical data with certified personnel approved by NASA).
- 4) Engine test cell operator (Contractor certified based on approved technical data).
- 5) Auxiliary Power Unit (APU) engine run (Contractor certified based on approved technical data).
- 6) Brake rider (Contractor certified based on approved technical data).
- 7) Weight and balance quality assurance inspector(s), to include use of the automated weight and balance system (AWBS) (certified via formal Government approved AWBS classroom training or in-house training provided by certified AWBS instructor).
- 8) Explosive handling/storage/shipment. Training shall include a review of responsibilities as defined in NASA JPD 4500.1, *Pyrotechnics – Logistics Management* (trained and certified in accordance with NASA-STD-8719.12, *Safety Standard for Explosives, Propellants, and Pyrotechnics*).
- 9) Engine flexible borescope inspection (Contractor certified based on approved technical data)
- 10) Non-destructive inspection procedures (shall maintain a minimum of two (2) level 3 qualified NDI technicians) (certified and qualified in accordance with AIA-NAS-410, *Aerospace Industries Association, National Aerospace Standard-410 Certification & Qualification of Nondestructive Test Personnel*).
- 11) Parachute repack (certified in accordance with DoD or FAA requirements)
- 12) Emergency response team training for each type aircraft listed in this SOW (Contractor certified based on approved technical data).
- 13) Pressure Systems (per JPR 1700.1, *JSC Safety and Health Handbook* and JPR 1710.13, *Design, Inspection, and Certification of Ground-Based Pressure Vessels and Pressurized Systems*)

¹⁶ In the event of a conflict between recertification training frequencies cited in this statement of work and those stipulated in other documents, the more frequent recertification training requirement shall apply.

4.5.4 Training – Specialty

4.5.4.1 Motor Vehicle Training

Ellington Field:

At Ellington Field, Contractor personnel who will operate motor vehicles on the flight-line ramp areas, hangars, and other associated JSC property shall attend training prior to doing so. Motor vehicle operations in these areas shall be conducted in accordance with Houston Airport System Operating Instruction 95-03, *Vehicle Access and Operating Requirements*.

At the El Paso Forward Operating Location (FOL), Contractor personnel who will operate motor vehicles on the flight-line ramp areas, hangars, and other associated NASA and El Paso International Airport (EPIA) property shall attend training prior to doing so. Motor vehicle operations in these areas shall be conducted in accordance with 49 CFR 1542, *Airport Security, Section 1542.201*.

In addition, the Contractor will ensure personnel operating a vehicle on JSC Property are trained and familiar with the rules and regulations contained in JPR 1600.3, *JSC Traffic Regulations*.

4.5.4.2 Tire and Wheel Maintenance Safety Training

The Contractor shall provide tire and wheel maintenance safety training to all Contractor personnel that handle and maintain tires and wheels, to include logistics personnel, for both aircraft and support equipment. Examples of training include:

- 1) Familiarization with the processes and procedures contained in approved technical data for tire and wheel maintenance (for example, removal, replacement, servicing) as it applies to each type/model/series aircraft and support equipment (as applicable) assigned to AOD.
- 2) Tire tear-down and build-up for backshop (intermediate maintenance).
- 3) Operation of nitrogen and high pressure air servicing equipment.
- 4) Use and handling of aircraft and support equipment tire remote inflation equipment.
- 5) Packaging, shipping, receiving and storing of tire and wheel assemblies.
- 6) Calibration cycles and requirements for tire and wheel servicing equipment.
- 7) Multi-piece rim wheel training in accordance with Code of Federal Regulations (CFR) 29 CFR 1910.177.

4.5.4.3 Egress Familiarization Training

The Contractor shall:

- 1) Maintain an ejection seat equipped aircraft training syllabus for egress system familiarization.
- 2) Provide Contractor and Government personnel who access aircraft cockpits with egress system initial and refresher familiarization training.
 - a. Initial training must be received prior to accessing cockpits.¹⁷
 - b. Maintain a master list of personnel obtaining the Egress/Cockpit Familiarization initial and refresher training.
 - c. Schedule Contractor and Government personnel for refresher training every twenty-four (24) months. Individuals overdue on egress familiarization training shall not access aircraft cockpits until they complete the familiarization training.¹⁸

4.5.4.4 Flight Line Services Training

The Contractor shall provide flight line services training for Contractor personnel in accordance AOD 34100, *Maintenance Manual*.

4.5.4.5 Water Survival Training

4.5.4.5.1 All Aircraft

The Contractor shall provide water survival training as follows:

- 1) Train NASA and Contractor aircrew personnel (includes astronauts, staff pilots, and mission crew members).
- 2) Provide training as requested by the Government.
- 3) Obtain NASA approval for pool selection.
- 4) Review, update, and maintain the following supporting documents that shall be used by the Contractor to provide and support water survival training:
 - a. AOD Form 257, *T-38 Water Survival Training*
 - b. AOD WI 33953, *T-38 Water Survival Training*

4.5.4.5.2 Pressure Suit

The Contractor shall provide pressure suit water survival training as follows:

- 1) Provide WB-57 pressure suit water survival refresher training to NASA and Contractor aircrew personnel (includes astronauts, staff pilots, and mission crew members) as required.
- 2) Review, update, and maintain the following supporting documents that shall be used by the Contractor to provide and support water survival training:
 - a. AOD Form 258, *WB-57 Water Safety Survival Training Checklist*
 - b. AOD WI 33955, *WB-57 Pressure Suit Water Survival Training*

¹⁷ Anticipate three government personnel will require initial egress familiarization training annually.

¹⁸ Anticipate 30-40 government personnel will require the 24-month recurring egress refresher training.

4.5.4.6 Mishap Investigation Training

The Contractor shall ensure all Contractor personnel assigned to investigate a mishap or high-visibility close call, at a minimum, have completed the following courses available through System for Administration, Training and Educational Resources for NASA (SATERN) as required by Johnson Space Center Work Instruction (JWI) 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan* within the last year:

- 1) SMA-001-07 Introduction to Mishap Investigation
- 2) SMA-002-07 Overview of Mishap Investigations
- 3) SMA-002-08 Mishap Investigation Roles and Responsibilities
- 4) SMA-002-09 Completing the Investigation and Mishap Report
- 5) SMA-002-10 Root Cause Analysis

4.5.4.7 Engineering Data Management System Training

The Contractor shall provide training for all civil service and contract employees that require access to the Government provided engineering data management (EDM) system described in SOW Subsection 4.9.4.

4.5.4.8 Hangar Door Operation

The Contractor shall ensure personnel are trained in hangar door operations in accordance with the following manufacturer's instructions:

- 1) Hangar E276 and Hangar E135: Industrial Door Contractors Inc., *Operations and Maintenance Manual*
- 2) Hangar E990: Hampshire Construction & Associates, *E-990 Operation & Maintenance Basic Manual*

4.5.4.9 Government Industry Data Exchange Program Training

The Contractor shall provide personnel trained in Government Industry Data Exchange Program (GIDEP) and the Federal Aviation Administration (FAA) suspected unapproved parts (SUP) program and shall coordinate all such actions with the NASA AOD GIDEP and FAA SUP representative assigned to the Aircraft Quality Assurance Branch.

4.5.4.10 Welders

The Contractor shall ensure all welders are trained and qualified in accordance with American Welding Society (AWS) D17.1/D17.1M:2010-AMD1, *Specification for Fusion Welding for Aerospace Applications*.

4.5.5 Training – Additional

The Contractor shall develop training materials and provide additional training classes upon request from the Contracting Officer (CO) or Contracting Officer's Representative (COR).

4.6 Travel

4.6.1 General Travel

The Contractor shall provide travel arrangement services for Contractor and civil servant personnel.

4.6.1.1 Generic

The Contractor shall:

- 1) Travel predominantly using commercial air unless requested by NASA to travel using Government air or other conventional modes.
- 2) Travel during normal duty hours to prevent excessive overtime unless approved otherwise by NASA.
- 3) Provide services in accordance with Joint Travel Regulations or Federal Travel Regulations as applicable.
- 4) Use the Government-provided system used to plan, book, track, approve, and request reimbursement for travel services for the Federal employee.

4.6.1.2 SPOT, Passports, and Visas

The Contractor shall ensure that all personnel supporting OCONUS deployments possess passports, obtain Visas, and participate in the SPOT letter of authorization (LOA) system under NASA sponsorship when required.

4.6.1.3 Security Briefings

The Contractor shall ensure that all personnel supporting foreign deployments participate in security briefings per NASA Procedural Requirement (NPR) 1600.1, *NASA Security Program Procedural Requirements* and NPR 1660.1, *NASA Counterintelligence and Counterterrorism*.

4.6.2 Deployment Travel

The Contractor shall provide personnel at deployed aircraft locations both within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS). The Contractor shall:

- 1) Coordinate with and receive approval from the NASA Program requesting deployment support (WB-57, Guppy, G-III, etc.) to determine which technical disciplines and staffing levels will be required to support each deployment.
- 2) Ensure all support personnel have security clearances, if required, by NASA based on mission.
- 3) Ensure personnel meet all health, passport, Visa, air carrier, and security requirements when travelling.
- 4) Identify deployment personnel at least sixty (60) days in advance of OCONUS deployments in order to support Visa application and Synchronized Pre-deployment and Operational Tracker (SPOT) enrollment. NASA may require more than sixty (60) day notice for deployment to some locations.

- 5) Provide medical insurance including medical evacuation insurance for OCONUS deployed personnel.

4.6.3 Conferences

The Contractor shall:

- 1) Attend conferences per Government request,
- 2) Receive concurrence from the COR and approval from the NASA CO 30 days prior to attending any Contractor requested conferences.
- 3) When requested by the Government, provide a written Trip Report within 30 days.

4.7 Operational Risk Management

The Contractor shall support an operational risk management (ORM) program throughout the workplace in accordance with JPR 8000.4, *JSC Risk Management Plan*.

4.8 Configuration Control

4.8.1 Configuration Management

The Contractor shall support configuration management of all aircraft and support equipment. The Contractor shall:

- 1) Maintain the configuration of all NASA aircraft and support equipment in accordance with all approved drawings, specifications, and other data.
- 2) Maintain configuration for type certificated aircraft.¹⁹

¹⁹ This would include any supplemental type certificates and field-approved alterations incorporated into the aircraft by NASA approved authorities.

4.8.2 Configuration Tracking

The Contractor shall use the configuration module in NAMIS to track open and completed configuration items issued against all aircraft, engines, support equipment, and other ancillary equipment.

4.8.3 Configuration Control Panel (CCP)

The Contractor shall:

- 1) Support NASA configuration control in accordance with AOD 33839, *Engineering Work Instruction Aircraft Configuration Control*.
- 2) Post Configuration Control Panel (CCP) meeting minutes and approved Configuration Control Panel Directives (CCPDs) to a NASA approved database for retrieval by AOD personnel.

4.9 Document and Data Management

4.9.1 NASA Aircraft Management Information System (NAMIS) Usage

The Contractor shall:

- 1) Use the Government provided NASA Aircraft Management Information System (NAMIS)²⁰ for aircraft operations, maintenance, and logistics support.
- 2) Use all NAMIS application modules in accordance with NPR 7900.3, *Aircraft Operations Management Manual* unless waived in writing by the NASA COR.
- 3) Enter a clear precise narrative description of the discrepancy and corrective action. Examples include:
 - a. Troubleshooting findings
 - b. Test equipment used
 - c. Serial number of critical calibrated equipment (e.g. torque wrenches)
 - d. Original discrepancy was or was not duplicated
 - e. Ultimate repair actions
- 4) List the technical reference that was utilized for the repair/inspections to correct the reported anomaly. The Contractor shall include the technical order/directive, engineering work order or maintenance manual number, paragraph, figure, and page number as applicable.
- 5) Enter actual elapsed maintenance times in the regular or dispatch hour block in NAMIS for each maintenance action as applicable.
- 6) Suggest recommendations for NAMIS process/software improvements.

²⁰ NAMIS is an integrated automated database used to capture aircraft operations, maintenance, and logistics information in support of NASA Centers that operate aircraft. NAMIS will track all scheduled inspections (inspections based on calendar, hourly, cycles, or events) and user discrepancies (unscheduled maintenance) "real-time" that are reported against aircraft, aircraft components, equipment, and special tooling.

4.9.1.1 NAMIS Application Administrator

The Contractor shall provide a NAMIS application administrator and alternate with expertise on the day-to-day use of the NAMIS system by the end of contract phase-in period.²¹ Example application administrator tasks include:

- 1) Manage Contractor personnel access permissions and assigned roles
- 2) Create templates for assigned assets
- 3) Establish inspection baseline information including NASA approved deviations

4.9.2 Records Management

The Contractor shall provide records management services in accordance with AOD 34100, *Maintenance Manual*.

4.9.3 Technical Library

The Contractor shall:

- 1) Support and maintain the Technical Library in accordance with AOD 34100, *Maintenance Manual*.
- 2) Receive, prepare, and route AOD Form 1298, *Maintenance Directive (MD) Approval Form*, to the Government for approval in accordance with AOD 34100, *Maintenance Manual*.

4.9.4 Engineering Data Management

4.9.4.1 General Requirements

The Contractor shall maintain all existing and newly generated engineering drawings and engineering electronic data under configuration control using the Government provided engineering data management system.

4.9.4.2 Engineering Computer Aided Design (CAD) Files

The Contractor shall maintain all CAD files and other applicable engineering data using the government provided drawing and data management system.²² The Contractor shall:

- 1) Maintain all newly created or modified engineering drawings in both Portable Document Format (PDF) and native file formats. One PDF file shall contain all of the drawing sheets and Drawing Change Notices (DCNs) for one drawing/document number.

²¹ See SOW Subsection 4.5.2 for government provided training for the NAMIS Database Administrator.

²² NASA currently uses the BlueCielo Meridian Enterprise drawing and data management system.

4.9.4.3 Engineering Project Records

The Contractor shall provide engineering records management services. The Contractor shall:

- 1) Maintain records per AOD 33820, *Engineering Projects* for each assigned engineering project in project files stored electronically on the AOD Engineering server.
- 2) Keep the project files as a historical record for each completed project. The project files shall be organized so that AOD engineers unfamiliar with a project can locate historical data when needed.

4.9.4.4 Engineering Archival Hard Copy Data

The Contractor shall maintain all AOD engineering archival hard copy data under configuration control. This data is comprised of paper/vellum drawings, documents, and aperture cards. The Contractor shall:

- 1) Maintain all existing archival documentation. Examples include:
 - a. Aircraft aperture cards (over 300,000 cards)
 - b. Paper and vellum drawings (over 100,000 drawings)
 - c. Drawing change notices
 - d. Engineering Work Orders
 - e. Fleet Modification Instructions (FMI)
 - f. Engineering reference material
- 2) Archive new hard copy data.
- 3) Provide configuration/revision control for changes to hard copy archival data.

4.9.4.5 Scanning and Duplication

The Contractor shall provide scanning and duplication support services. Example tasks include:

- 1) Provide maintenance services for Government provided scanning, duplicating, and aperture card reader equipment.
- 2) Provide support to scan, electronically store, and print paper copies of engineering drawings up to "J" size (34" wide x 48" to 144" long).²³
- 3) Provide support to print paper copies of drawings from aperture cards up to "C" size (17" x 22").²³
- 4) Provide support to print drawings up to "J" size at the El Paso forward operating location.

4.9.5 Data Backup

The Contractor shall ensure that personnel follow data backup procedures so that no loss of data will occur due to hardware or software anomalies or destruction/damage to facilities.

²³ This service shall be available to all AOD Engineering Branch members (contractor and civil servant).

4.10 Information Technology Systems

The Contractor shall:

- 1) Adhere to NASA policies for the management of information technology (IT) resources.
- 2) Utilize the Government provided IT systems to accomplish the requirements in this SOW.²⁴
- 3) Adhere to NASA security procedures for the unauthorized use of Government computer systems.

4.11 Facility Management

4.11.1 Facility Manager/Alternates

As requested by the Government, the Contractor shall assign a facility manager and/or alternate to each hangar, building, warehouse, or facility. Duties include:

- 1) Perform facility inspections in accordance with AOD 33877, *Monthly/Quarterly Safety and Health Inspection*.
- 2) Report discrepancies (particularly those with safety or health implications).
- 3) Act as a point of contact for assigned facility.
- 4) Maintain up-to-date emergency action plans for the facility assigned.
- 5) Participate in educating occupants of assigned buildings on emergency evacuation plans.

²⁴ NASA will provide the necessary IT equipment and applications to accomplish the requirements of the SOW such as workstations, the Microsoft Office Suite of applications, and NASA internet access. Additional Government provided IT systems include, but are not limited to, such applications as NASA Aircraft Management Information System (NAMIS) as well as numerous other DoD technical data and logistics management systems.

4.11.2 Facilities

The Contractor shall use the NASA facilities listed in Table 1-1 and Table 1-2.^{25, 26}

4.11.3 Government Access

The Contractor shall allow Government representatives access to work areas, data, provide support, and not interfere with the quality assurance evaluators (QAE's), State, Federal, and other designated personnel in the performance of their official duties.

²⁵ See Section J, Attachment J-3-1 for a list of installation accountable Government property.

²⁶ The Contractor shall ensure an explosive facility license (AF IMT 2047) is posted in all facilities storing or handling explosives in accordance with Air Force Manual (AFMAN) 91-201, Explosive Safety Standards. The licensing shall be coordinated with the NASA designated representatives.

L4.0 Contract Management – LaRC Center Unique

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5.0 Program and Project Support

5.1 General Requirements

The Contractor shall provide program and project support to NASA. Projects may include NASA reimbursable programs, internal development projects, and new business opportunities generated as a result of shifting budgets and mission priorities. Example support services include:

- 1) Research, development, acquisition, and sustainment efforts across a broad spectrum of functional disciplines in order to effectively assist in the implementation of Government objectives.
- 2) Develop quick-reaction capabilities (QRC), streamlined acquisition and development processes, advanced concepts and technology demonstrations (ACTD), user concept of operations (CONOPS), technical assessments, and system development that will support near-term and long-term operational requirements for NASA and other Government agencies.
- 3) Support meetings and be prepared to discuss activities or present data related to the contract as requested by the Government.

5.2 Project Management

The Contractor shall provide project management, project control, and schedule support services for NASA projects. Project managers shall be responsible for managing and executing projects with matrix support from other contract elements in this SOW. Project management support includes tasks such as planning, organizing, technical analysis and recommendations, scheduling, and reporting. Example project management tasks include:

- 1) Task Management and Control: The Contractor shall develop and present to NASA task management plans describing the technical approach, organizational resources, and management controls to meet the technical, cost, and schedule requirements of NASA projects.
- 2) Schedule Monitoring and Control: The Contractor shall develop and present to NASA project schedules. The Contractor shall monitor project progress, and update schedules as required.
- 3) Cost Monitoring: The Contractor shall provide cost monitoring of project and program activities.

5.2.1 Project Risk Management Plans

The Contractor shall develop and administer risk management plans in support of project activities. The Contractor shall inform NASA of technical, cost, and schedule risks and provide recommendations for mitigating those risks.

5.2.2 Reports and Briefings

The Contractor shall develop reports, briefings, briefing materials, informational brochures, photographs, and test/demonstration/feasibility portfolios including draft and final versions.

5.2.3 Funding Plans & Budget Support

The Contractor shall provide funding plans and budget support for NASA projects. Examples include:

- 1) Conduct financial studies and research.
- 2) Compile, analyze, review, and present financial data.
- 3) Evaluate project funding plans and changes.
- 4) Perform project budgeting, analysis, and assistance in the preparation and routing of financial documents.

5.3 Project Support Services

5.3.1 General Support

The Contractor shall:

- 1) Attend project design reviews, technical interchange meetings, user conferences, program status reviews, management and design reviews, flight readiness reviews, and other reviews per NASA request for projects and programs.
- 2) Present briefings, record and distribute minutes, and complete assigned action items or specific assignments resulting from these meetings.

5.3.2 Data Gathering

The Contractor shall conduct data gathering and perform site surveys required to support the conduct of technical studies and analyses, exercises and demonstrations, contingencies, quick reaction tasks, and other requirements. The Contractor may be required to attend and monitor operations at both on and off-site locations in order to gather, compile, develop and edit raw print, video, or digital data and summarize documentation depicting the wide range of project or sponsor capabilities into hard copy or multimedia formats.

5.3.3 Acquisition Liaison Support

The Contractor shall provide acquisition support services for projects. Example tasks include:

- 1) Review and prepare technical specifications and supporting documentation.
- 2) Provide liaison support between program/project management and logistics for procurements.

5.3.4 Technical Support

The Contractor shall provide technical support services for projects. Example tasks include:

- 1) Support research, development, and production.
- 2) Research candidate technologies and plan for upgrades and improvements to aircraft, equipment, facilities, processes, and programs. The Contractor shall provide to NASA recommendations with written rationale on methods to better integrate new technologies.
- 3) Support aircraft and equipment maintenance issues.
- 4) Support developing systems, subsystems, equipment, and components, and provide sustaining technical support as required.
- 5) Safety analysis.

5.3.5 Administrative Support

The Contractor shall provide the necessary administrative support services to perform the requirements in SOW Subsection 5.0.

5.4 Aircraft and Payload Integration

The Contractor shall provide integration support for payloads, sensors, aircraft upgrades, experiments, and instrumentation. Example tasks include:

- 1) Coordinate user and aircraft availability schedules.
- 2) Provide existing data on aircraft to potential users of the aircraft.
- 3) Coordinate and assist in the assembly, checkout, installation, and troubleshooting of payloads and other equipment.
- 4) Coordinate payload integration requirements and configurations with appropriate customer organizations.
- 5) Support development and review of payload data packages (PDP) for each new system integration.
- 6) Support test and evaluation (T&E) and validation and verification (V&V) activities
- 7) Develop payload integration timelines.
- 8) Providing payload operations and development guidance to the customer for unique aircraft operating conditions.
- 9) Participate in sensor operations training and dress rehearsals scenarios as it relates to the NASA aircraft projects.
- 10) Participate in payload Test Readiness Reviews (TRRs) as required.

5.5 Mission Planning and Development

The Contractor shall provide mission planning and development support services. Example tasks include:

- 1) Identify aircraft and aircraft systems required to meet mission needs.
- 2) Recommend sensor suite and aircraft optimizations/upgrades to enhance mission capabilities.
- 3) Develop tasking and collection requirements.
- 4) Develop mission cost estimates
- 5) Prepare memorandums of understanding/agreements (MOU/MOA)
- 6) Prepare project implementation plans (PIP)
- 7) Prepare mission related documents:
 - a. Proposals
 - b. Concept of operations (CONOPS)
 - c. Aircraft and personnel clearance automated clearance system (APACS)
 - d. Letters of authorization (LOA)
 - e. Mission partner coordination, etc.

5.6 Mission Coordination, Implementation, and Execution

The Contractor shall provide mission coordination, implementation, and execution services for CONUS and OCONUS operations. Examples tasks include:

- 1) Coordinate military airlift requests
- 2) Identify, provide, and coordinate Liaison Officer activities
- 3) Provide advance teams for CONUS and OCONUS missions
- 4) Develop, provide, and execute logistics plans
- 5) Provide data collection management support
- 6) Develop mission execution timelines
- 7) Support the Communications Security custodian as necessary
- 8) Development and execution of test cards
- 9) Support specialized equipment maintenance, training, and operations for Special Mission Unit support

5.7 Deployment Support

5.7.1 General Deployment Support

The Contractor shall support aircraft deployments both within the contiguous United States (CONUS) and outside the contiguous United States (OCONUS). The Contractor shall:

- 1) Provide personnel in appropriate disciplines to support deployed operations.
- 2) Perform similar tasks at the deployed location as if the personnel were at their home location.
- 3) Ensure that deployed personnel have all of the resources necessary to perform their work at the deployed location including essential tools, hardware, and safety related equipment.
- 4) Provide deployment support. Example tasks include:
 - a. Perform duties identified in NPR 7900.3, *Aircraft Operations Management*.
 - b. Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with approved technical data.
 - c. Perform normal and emergency procedures in accordance with approved technical data.
 - d. Support Operational Readiness Reviews (ORR) on aircraft prior to deployment in accordance with Aircraft Operations Division AOD 33872, *Operation Readiness Review*.
 - e. Provide/augment NASA deployment management support.
 - f. Coordinate mission partner assistance when necessary.
 - g. Collate various customer needs into a single cohesive data collection plan.
 - h. Develop deployment cost estimates.
 - i. Develop and maintain mission schedules.
 - j. Generating mission briefings.
 - k. Support the communications security (COMSEC) custodian as necessary.
 - l. Develop/provide/execute logistics plans in support of deployed operations.
 - m. Conduct data gathering and perform site surveys required to support the conduct of deployed flight operations.

5.7.2 Specialty Deployment Support

If necessary, the Contractor shall provide personnel to support DOD sponsored WB-57 missions in OCONUS locations. These missions would be executed under a separate, non-NASA contract.

Personnel requirements for OCONUS DOD WB-57 missions may include aircraft maintenance, life support technicians, mission management, quality, and aircrew positions. Additional support, on a short term basis, may be required to support WB-57 airworthiness activities including engineering and egress support. Deployments may last up to one year per aircraft. Two aircraft may be simultaneously deployed to different OCONUS locations. Clearance requirements for personnel supporting any DOD deployments will be dictated by mission requirements.

5.7.3 Special Events

The Contractor shall support coordination, setup, and teardown support for special events as required. Examples include:

- 1) AOD all hands meetings
- 2) AOD awards ceremonies
- 3) Airshows
- 4) Public relations events
- 5) Crew return activities
- 6) Visitor support

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6.0 Flight Operations

6.1 Flight Operations Support

The contractor shall provide flight operations support at both CONUS and OCONUS locations. The procedures and guidelines for management, utilization, operation and control of aircraft is contained in NPR 7900.3, *Aircraft Operations Manual*.

6.2 Duty Office

6.2.1 Operations Duty Officer

Upon Government request, the Contractor shall provide an Operations Duty Officer (ODO). The ODO shall support flight operations as detailed in AOD 33925, *Operations Duty Officer (ODO) Instructions*.

6.2.2 Scheduler

The Contractor shall support flight scheduling activities for all aircraft operated by AOD. The Contractor shall coordinate the requests generated by NASA managers, flight crews, project engineers, and others associated with flight operations to create an efficient use of aircraft assets.

6.3 Flight Crew

6.3.1 General Requirements

The Contractor shall provide flight crew personnel to operate and support AOD aircraft in accordance with NPR 7900.3, *Aircraft Operations Management*, AOD 09295, and other JSC/AOD approved operational directives. See Appendix C, *Personnel Requirements*, for additional information.

6.3.2 Pilots

Upon Government request, the Contractor shall provide personnel to perform piloting duties.

6.3.3 Ground and Simulator Instructors

Upon Government request, the Contractor shall provide personnel to perform Ground or Simulator Instructor duties.

6.3.4 Flight Engineers

Upon Government request, the Contractor shall provide Flight Engineers. Example duties include:

- 1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
- 2) Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists and procedures.
- 3) Perform normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
- 4) Perform functional check flights (FCF) or operational checks (OPS CK) on aircraft in accordance with AOD 34100, *Maintenance Manual*, and applicable aircraft checklists.
- 5) Perform/support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Review*.
- 6) Review and determine that weight and center of gravity are within limits for flight in accordance with NPR 7900.3, *Aircraft Operations Management* and ensure copy of weight and balance data is carried aboard aircraft.
- 7) Perform ground engine runs when requested by maintenance personnel. Flight engineers who perform ground engine runs shall be certified in accordance with AOD 09295, *Aircraft Operations and Training Procedures*.
- 8) Assist in trouble-shooting aircraft systems if requested by maintenance personnel.
- 9) Perform instructor or examiner flight engineer duties, if designated, in accordance with applicable directives.

6.3.5 Sensor Equipment Operators

Upon Government request, the Contractor shall provide Sensor Equipment Operators (SEO). Example duties include:

- 1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
- 2) Serve as sensor equipment operator for all onboard payloads and sensors.
- 3) Perform preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists and procedures.
- 4) Perform normal and emergency procedures in accordance with the aircraft flight manual and NASA approved flight crew checklists.
- 5) Support/perform functional check flights or operational checks on aircraft in accordance with AOD 34100, *Maintenance Manual*, and applicable aircraft checklists.
- 6) Support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Review*.
- 7) Support flight readiness reviews (FRRs) and test readiness reviews (TRRs) in accordance with AOD 33840, *Flight Readiness Review and Test Readiness Review*.
- 8) Assist in trouble-shooting aircraft systems if requested by maintenance personnel.
- 9) Support the development of payload data packages (PDP) for payload/system integration.
- 10) Develop SEO checklists.
- 11) Develop and execute flight test cards.
- 12) Participate in sensor operations training and dress rehearsals scenarios as it relates to the WB-57 program.

- 13) Perform instructor or examiner special equipment operator duties, if designated, in accordance with applicable directives.

6.3.6 Test Directors

Upon Government request, the Contractor shall provide test directors. Example duties include:

- 1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
- 2) Perform normal and emergency procedures in accordance with the aircraft flight manual and NASA approved flight crew checklists and procedures.
- 3) Provide ground and in-flight support to ensure personnel safety.
- 4) Provide support to schedule customers for aircraft missions.
- 5) Serve as a technical interface to obtain answers to customer payload integration questions.
- 6) Communicate customer mission requirements to NASA technical and aircrew personnel.
- 7) Support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Review*.
- 8) Support FRRs and TRRs in accordance with AOD 33840, *Flight Readiness Review and Test Readiness Review*.
- 9) Provide support to install and remove customer payloads from aircraft.
- 10) Assist in trouble-shooting payload integration issues.
- 11) Provide in-flight support to manage customer payload activities.

6.3.7 Loadmasters

Upon Government request, the Contractor shall provide loadmasters. Example duties include:

- 1) Serve as aircrew in accordance with NPR 7900.3, *Aircraft Operations Management*.
- 2) Support preflight, through-flight, and post-flight inspections on NASA aircraft in accordance with the aircraft flight manual or NASA approved flight crew checklists.
- 3) Support normal and emergency procedures in accordance with the Aircraft Flight Manual and NASA approved flight crew checklists.
- 4) Support functional check flights or operational checks on aircraft in accordance with AOD 34100, *Maintenance Manual*, and applicable aircraft checklists.
- 5) Support operational readiness reviews on aircraft prior to deployment in accordance with AOD 33872, *Operation Readiness Review*.
- 6) Support FRRs and TRRs in accordance with AOD 33840, *Flight Readiness Review and Test Readiness Review*.
- 7) Assist in trouble-shooting aircraft systems if requested by maintenance personnel.
- 8) Support the development of payload data packages (PDP) for payload/system integration.
- 9) Participate in flight operations training and dress rehearsals scenarios.
- 10) Perform instructor or examiner loadmaster duties, if designated, in accordance with applicable directives.
- 11) Perform pre-mission and post-mission planning activities that are required to ensure that all cargo and payload operations meet all flight safety requirements.

- 12) Plan, coordinate, and execute transportation of cargo and mission payloads, and associated support equipment to ensure that all cargo and payloads meet required flight schedules and are delivered safely to the required destination.
- 13) Initiate all pre-mission activities prior to arrival of other mission personnel. Pre-mission activities include cargo load planning, cargo preparation, material handling equipment preparations and positioning, cargo-loading procedures, customer coordination, and cargo aircraft center-of-gravity requirements.
- 14) Operate the Super Guppy cargo loaders used to support Super Guppy cargo transport operations and other required aircraft loading and offloading equipment.
- 15) Review and determine that weight and center of gravity are within limits for flight. Provide appropriate weight and balance data to the aircraft pilots and flight engineers for the purpose of computing required takeoff and landing data.
- 16) Perform post-mission activities which include cargo unloading, materials handling equipment preparation and positioning, and cargo preparation.
- 17) Maintain all documentation related to Super Guppy missions. The Contractor shall ensure that all files are accurate and complete and can be accessed for future missions. The Contractor shall maintain maintenance files on all mission support equipment. The Contractor shall be required to perform weight and balance calculations.
- 18) Provide monitoring and maintenance of shipping fixtures and support equipment.
- 19) Maintain all mission support equipment with associated certification and calibration data. The Contractor shall ensure all mission support equipment certification and calibration is current.
- 20) Obtain military Special Assignment Airlift Mission (SAAM) aircraft, Commercial Charter transportation services for both cargo and passengers, surface vessel charters, as identified by the COR to support NASA programs and projects.

6.3.8 Mission Managers

Upon Government request, the Contractor shall provide mission managers.

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7.0 Maintenance

7.1 General Requirements

The Contractor shall provide a labor pool of qualified personnel to accomplish aircraft maintenance and support services for aircraft as required by the Government. Aircraft include:

- 1) Aircraft listed in Table 1-3: JSC Aircraft and Engine Assignments.
- 2) Additional training or mission aircraft. The aircraft type, model, and series will be determined at a future date.
- 3) Other U.S. Government/external organization aircraft.

The Contractor shall adhere to the maintenance disciplines specified in AOD 34100, *Maintenance Manual*.

The Government reserves the right to perform occasional aircraft maintenance on Government-owned aircraft, engines, accessories and other ancillary equipment.

7.2 Maintenance Control

Maintenance Control coordinates all maintenance activities. The Government will have overall authority and will provide priorities and direction for scheduled, unscheduled and configuration maintenance activities. The Contractor shall support the Government in Maintenance Control functions in accordance with AOD 34100, *Maintenance Manual*.

7.2.1 Aircraft Release Authority

The Contractor shall support releasing aircraft safe for flight in accordance with AOD 34100, *Maintenance Manual*.

7.2.2 Flight Line Services

The Contractor shall support flight line services in accordance with AOD 34100, *Maintenance Manual*.

7.2.3 Aircraft Acceptance and Transfer

The Contractor shall assist the Government in conducting aircraft and equipment acceptance and transfers in accordance with AOD 34100, *Maintenance Manual*.

7.2.4 Plans, Scheduling, and Documentation

The Contractor shall support the Government with development of plans and schedules in accordance with AOD 34100, *Maintenance Manual*.

7.2.5 Lightning/Sudden Severe Weather

The Contractor shall comply with lightning/sudden severe weather requirements and maintain and comply with the scheduled maintenance program for the Lightning Detection System in accordance with AOD 34100, *Maintenance Manual*.

7.2.6 Oil Consumption Tracking

The Contractor shall be responsible for tracking oil consumption in accordance with AOD 34100, *Maintenance Manual*.

7.2.7 Static Display and Training Aircraft

The Contractor shall prepare static display and training aircraft in accordance with AOD 34100, *Maintenance Manual*.

7.3 Production Control

Production Control coordinates all support shop services. The Government will have overall authority and will provide priorities and direction for production control activities. The Contractor shall support production control functions in accordance with AOD 34100, *Maintenance Manual*.

7.3.1 Support Shop Services

7.3.1.1 General

The Contractor shall provide a labor pool of qualified personnel to support the shops/facilities shown in Table 1-1 and Table 1-2 when directed by the Government. The Government anticipates shops will be staffed on an as-needed basis. Not all shops will be staffed full-time. Example support shop services include:

- 1) Electrical Systems
- 2) Communications and Navigation (COM/NAV) Systems
- 3) Pneudraulics Systems and Components
- 4) Mechanical Accessories
- 5) Sheetmetal and Composites
- 6) Welding
- 7) Battery
- 8) Paint and Corrosion Prevention and Treatment
- 9) Wheel and Tire Assembly/Disassembly
- 10) Manufacturing
- 11) Machining
- 12) Heat Treating
- 13) J-85 Engines

7.3.1.2 Egress Systems Shop

The Contractor shall provide egress support in accordance with AOD 34100, *Maintenance Manual*.

7.3.1.3 Personal Equipment Shop

The Contractor shall support aircrew personnel equipment in accordance with AOD 34100, *Maintenance Manual*.

7.3.1.4 Non-Destructive Inspection (NDI) Shop

The Contractor shall maintain aircrew personnel equipment in accordance with AOD 34100, *Maintenance Manual*.

7.3.1.5 J-85 Engines

The Contractor shall support the J-85 Engine activity in accordance with approved technical data.

7.3.1.5.1 Engine Test Cell

The Contractor shall maintain, operate, and inspect the J-85 Engine Test Cell in accordance with AOD 34100, *Maintenance Manual*.

7.3.1.5.2 T-38 Trim Pad

The Contractor shall utilize 1T-38A-2-1, *General Airplane*, when positioning an aircraft into the Trim Pad Sound Suppressor.

7.3.1.5.3 J-85 Shipping

The Contractor shall prepare NASA J-85 engines in accordance with NASA J-85 Shipping Instructions contained in T.O. 1T-38A-2-6.

7.4 Maintenance Programs

The objective of the three-tier maintenance program (organizational, intermediate, and depot level) is to maintain aircraft and equipment while optimizing the use of personnel, facilities, material, equipment and funds to achieve mission success. The Contractor shall support the Government with planning, scheduling, forecasting, and execution of aircraft maintenance activities.

7.4.1 Aircraft Logs and Records

The Contractor shall support the Government in maintaining aircraft logs and records in accordance with AOD 34100, *Maintenance Manual*.

7.4.2 Product Identification and Traceability

The Contractor shall support Government product identification and traceability in accordance with AOD 34100, *Maintenance Manual*.

7.4.3 Disposition of Life-limited Aircraft Parts

The Contractor shall support the Government to ensure positive control of product identification and traceability of aircraft life-limited parts in accordance with AOD 34100, *Maintenance Manual*.

7.4.4 Trend Analysis

The Contractor shall support trend analysis in accordance with AOD 34100, *Maintenance Manual*.

7.4.5 Tool and Equipment Control

The Contractor shall implement tool and equipment control in accordance with AOD 34100, *Maintenance Manual*.

7.4.6 Foreign Object Elimination / Foreign Object Damage

The Contractor shall implement a foreign object elimination (FOE)/foreign object damage (FOD) program for NASA facilities and operating areas in accordance with AOD 34100, *Maintenance Manual*.

7.4.7 Facility Services

The Contractor shall support facilities services in accordance with AOD 34100, *Maintenance Manual*.

7.4.8 Weight and Balance

The Contractor shall support the Government's weight and balance program for each aircraft in accordance with AOD 34100, *Maintenance Manual*.

7.4.9 Corrosion Prevention and Control

The Contractor shall support corrosion prevention and control in accordance with AOD 34100, *Maintenance Manual*.

7.4.10 Fuel Surveillance

The Contractor shall conduct fuel surveillance in accordance with AOD 34100, *Maintenance Manual*.

7.4.11 Hydraulic Contamination and Prevention

The Contractor shall conduct hydraulic contamination prevention in accordance with AOD 34100, *Maintenance Manual*.

7.4.12 Joint Oil Analysis Program (JOAP)

The Contractor shall conduct a JOAP in accordance with AOD 34100, *Maintenance Manual*.

7.4.13 Electrostatic Discharge (ESD) Control and Prevention

The Contractor shall support ESD requirements in accordance with AOD 34100, *Maintenance Manual*.

7.4.14 Aviators Breathing Oxygen (ABO) Surveillance

The Contractor shall support ABO requirements in accordance with AOD 34100, *Maintenance Manual*.

7.4.15 Support Equipment (SE) Metrology and Calibration

The Contractor shall support SE, metrology and calibration requirements in accordance with AOD 34100, *Maintenance Manual*.

7.4.16 Pressure Vessels and Pressurized Systems

The contractor shall support Ground-Based Pressure Vessels and Pressurized systems in accordance with AOD 34100.

7.4.17 T-38 Simulator

The Contractor shall maintain and inspect the T-38N ground based simulator in accordance with:

- 1) T-38(SIM)-5, *T-38N Simulator Maintenance Plan (N900)*
- 2) T-38(SIM)-6WC, *T-38N Simulator Preventative Maintenance Inspection Work Cards*

7.4.18 Aircraft Storage and Preservation

The Contractor shall support aircraft preservation and storage services as directed by the Government.

7.5 El Paso Forward Operating Locations

7.5.1 Flight Line Services

The Contractor shall support flight line services in accordance with AOD 34100, *Maintenance Manual*.

7.5.2 T-38 Depot Maintenance

The Contractor shall:

- 1) Perform T-38 depot level work at the El Paso forward operating location. In situations where relocation of the aircraft to El Paso is not possible or practical, the NASA COR may direct the Contractor to perform the T-38 depot work at a different location.
- 2) Adhere to meeting requirements and administrative responsibilities as contained in AOD 34100, *Maintenance Manual*.

7.5.3 Super Guppy Support

The Contractor shall provide flight line and maintenance services for the Super Guppy at the El Paso FOL and other locations as required.

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8.0 Engineering

8.1 General Requirements

8.1.1 Overview

The Contractor shall provide engineering support services, including design, analysis, troubleshooting, and testing for aircraft, payload, and support equipment development, repairs, and upgrades. The Government will have overall authority and will provide priorities and direction for engineering activities. The Contractor shall work with NASA engineers as required to support mission requirements. The engineering support will cover both public use and FAA certificated aircraft. Support shall be provided in a timely manner to maximize aircraft or equipment availability. Example engineering support services include:

- 1) Aircraft maintenance support
- 2) Aircraft sustainment (e.g. locating supportable parts or generating repair procedures)
- 3) Aircraft upgrades
- 4) Aircraft troubleshooting
- 5) Aircraft ground and flight testing
- 6) Maintenance directive review and evaluations
- 7) Ground support equipment design, troubleshooting, and testing
- 8) Payload integration and testing
- 9) Payload shipping fixture design
- 10) Technical specifications and supporting documentation for procurements
- 11) Technical interface with other Government agencies and commercial companies

8.1.2 Engineering Schedules

When requested by NASA, the Contractor shall provide a schedule for assigned engineering tasks. The Contractor shall work with NASA to develop the schedule content. The Contractor shall:

- 1) Provide schedule support for all assigned tasks. Example schedule items include:
 - a. Resource allocation
 - b. Design completion
 - c. Analysis completion
 - d. Drawing release
 - e. Design reviews
 - f. Airworthiness reviews
 - g. Logistics and manufacturing
 - h. Flight and test readiness reviews
 - i. Test schedules
 - j. Engineering Work Order release schedule
- 2) Provide weekly schedule updates to NASA management.

- 3) Notify and receive approval for any schedule adjustments to NASA management as required.
- 4) Maintain baseline schedules to track schedule variance.

8.1.3 Engineering Cost Estimates

When requested by NASA, the Contractor shall supply engineering cost estimates (e.g. labor hours, material costs, subcontract costs). Example cost estimates include:

- 1) Aircraft repair costs
- 2) Aircraft upgrade costs
- 3) Aircraft troubleshooting and testing costs
- 4) Aircraft payload integration costs

8.1.4 Engineering Reviews

8.1.4.1 Airworthiness Reviews

The Contractor shall support or present engineering airworthiness reviews per AOD 33820, *Engineering Projects*.

8.1.4.2 Flight and Test Readiness Reviews

The Contractor shall support or present flight and test readiness reviews per AOD 33840, *Engineering Work Instruction Flight Readiness Review and Test Readiness Review*.

8.1.5 Systems Engineering

The Contractor shall support a systems engineering process for all tasks to support aircraft, payload, and ground support equipment development, repairs, or upgrades. The Contractor shall reference NASA/SP-2007-6105, *NASA Systems Engineering Handbook* for guidance. The goal of the systems engineering process is to provide optimal designs with an emphasis on increasing standardization, decreasing maintenance, and reducing technical risk. Example systems engineering tasks include:

- 1) Develop system architectures
- 2) Define and allocate requirements
- 3) Define and assess interfaces
- 4) Define, assess, and mitigate risks
- 5) Evaluate design tradeoffs to facilitate optimal designs based on cost, schedule and technical risk
- 6) Define verification and validation requirements
- 7) Support technical document development and reviews
- 8) Communicate system design goals across engineering and maintenance team

8.1.6 Task Delegation, Support, and Administration

NASA will assign individual support tasks to the Contractor. The Contractor shall conduct engineering tasks per the following AOD work instructions:

- 1) AOD 33820 *Engineering Projects*
- 2) AOD 33840 *Engineering Work Instruction Flight Readiness Review and Test Readiness Review*
- 3) AOD 33842 *Engineering Work Orders*

8.2 Design

8.2.1 General Requirements

The Contractor shall:

- 1) Reference AOD Engineering Document #8594002, *Design and Analysis Handbook, Aircraft Operations Division* for design guidance.
- 2) Conduct technical peer reviews for all engineering documentation, designs, and drawings prior to release. Example peer review tasks include:
 - a. Review documentation/drawings to minimize errors
 - b. Review documentation/drawings to ensure design suitability
 - c. Review documentation/drawings to ensure fabrication feasibility

8.2.2 Drafting and Computer Aided Design

8.2.2.1 Drawing Generation

The Contractor shall provide drafting and Computer Aided Design (CAD) services to support aircraft, payload, and ground support equipment development, repairs, or upgrades. The CAD systems (AutoCAD and Creo) will be Government furnished. The Contractor shall:

- 1) Provide drafting and CAD support. Example tasks include:
 - a. Electrical schematic generation
 - b. Printed circuit board design drawings
 - c. Wire list generation
 - d. Mechanical design drawings
 - e. Sheet metal design drawings
 - f. Structural design drawings
 - g. System level drawing generation
 - h. Aircraft configuration drawings
 - i. Drawing trees
 - j. Generating and maintaining CAD standards

- 2) Create designs and drawings using the AutoCAD or Creo CAD systems.²⁷
- 3) Create and maintain drawings in accordance with AOD 33849, *Engineering Work Instruction, Engineering Drawing Format, Requirements, and Procedures*.

8.2.2.2 Drawing Checking

The Contractor shall provide drawing checking services in accordance with AOD 33849, *Engineering Work Instruction, Engineering Drawing Format, Requirements, and Procedures*.

8.2.3 Electrical Engineering

The Contractor shall provide electrical engineering services to support aircraft, payload, and ground support equipment development, repairs, or upgrades. Example electrical engineering tasks include:

- 1) Avionics integration (Aeronautical Radio Incorporated (ARINC) and Mil-Std data buses)
- 2) Line Replaceable Unit (LRU) design and integration
- 3) Circuit design (analog and digital)²⁸
- 4) Wire harness design
- 5) Payload electrical interface design
- 6) Data recorder programming and data post-processing (e.g. Ballard Technology data recorders, Ballard CoPilot analysis software, Aeroflex Datatrak, reduced gravity accelerometer data recorder)
- 7) Troubleshooting using electrical and avionics test equipment (e.g. multimeters, oscilloscopes, avionics test equipment, buss analyzers, aircraft ground support equipment)

8.2.4 Mechanical/Aerospace Engineering

The Contractor shall provide mechanical/aerospace engineering services to support aircraft, payload, or ground support equipment development, repairs, or upgrades. Example mechanical/aerospace engineering tasks include:

- 1) Repairs to aircraft or equipment that are beyond the scope of DoD Technical Orders, manufacturer's repair manuals, or routine aircraft maintenance manuals
- 2) Generate engineering work orders in accordance with AOD 33842, *Engineering Work Orders*
- 3) Sheet metal design
- 4) Machined component design
- 5) Welded component design
- 6) Composite design
- 7) Pneumatic and hydraulic system design

²⁷ The government may require that only the Creo system be used for mechanical/structural projects based on program requirements.

²⁸ NASA may implement a new Computer Aided Design software package for electrical design during the life of the contract. If NASA does make this change, the Contractor shall support the migration to the new system.

8.3 Analysis

8.3.1 Structural Analysis

The Contractor shall provide structural analysis services to substantiate aircraft, payload, or ground support equipment development, repairs, or upgrades. Structural analyses shall be prepared and documented per AOD Engineering Document #8594001, *Preparation of Stress Analysis Reports*.

Example tasks include:

- 1) Handbook calculations and finite element analyses of airframe structures
- 2) Handbook calculations and finite element analyses of payload structures
- 3) Handbook calculations and finite element analyses of ground support equipment
- 4) Handbook calculations and finite element analyses for aircraft repairs
- 5) Weight and balance calculations

8.3.2 Electrical Analysis

The Contractor shall provide electrical analysis services to substantiate aircraft, payload, or ground support equipment development, repairs, or upgrades. Example tasks include:

- 1) Electrical loads analysis
- 2) Circuit analysis
- 3) Radio Frequency (RF) analysis including antenna pattern analysis, interference, and usage
- 4) Bus analysis
- 5) Timing analysis
- 6) Electromagnetic Interference (EMI) or Radio Frequency Interference (RFI) analysis

8.3.3 Failure Mode Effects and Criticality Analysis (FMECA)

The Contractor shall perform failure mode effects and criticality analyses when requested by NASA. The FMECA shall meet the intent of MIL-STD-1629, *Procedures for Performing a Failure Mode, Effects and Criticality Analysis* and NASA/SP-2007-6105, *NASA Systems Engineering Handbook*.

8.3.4 Hazard Analysis

The Contractor shall perform hazard analyses when requested by NASA. Hazard analyses for aircraft, payloads, and support equipment shall be in accordance with AOD 33840, *Engineering Work Instruction Flight Readiness Review and Test Readiness Review*.

8.4 Engineering Testing & Troubleshooting

8.4.1 Engineering Testing

The Contractor shall provide engineering test services for aircraft, payloads, and ground support equipment. Example testing tasks include:

- 1) Develop ground and flight test plans
- 2) Verify and validate the operation and safety of new designs, upgrades, and repairs
- 3) Flight Testing – Select instrumentation, perform data collection, and analyze data to evaluate aircraft system performance and identify flight anomalies. Flight test plans and reports shall be per AOD 33843, *Engineering Work Instruction Flight Test*
- 4) Ground Testing – Select instrumentation, perform data collection, and analyze data for aircraft and payload systems to evaluate system performance and identify anomalies
- 5) Bench Testing – Perform integration and testing of new or modified systems to verify operation and identify anomalies
- 6) Perform troubleshooting using schematics and diagnostic equipment to support maintenance personnel
- 7) Perform propulsion system performance assessments
- 8) Generate test reports

8.4.2 Engineering Troubleshooting

The Contractor shall provide engineering troubleshooting services to assist maintenance personnel in resolving aircraft, engine, payload, and ground support equipment issues. The goal shall be to resolve issues quickly to minimize aircraft downtime. Example engineering troubleshooting tasks include:

- 1) Diagnosing and resolving failures
- 2) Diagnosing and resolving electrical or mechanical interface issues between NASA aircraft and customer payloads

The Contractor shall:

- 1) Provide engineering troubleshooting support on-call, twenty-four (24) hours a day based on mission demands
- 2) Provide on-the-aircraft engineering troubleshooting support as required at NASA Centers, NASA forward operating location, or other CONUS or OCONUS location based on mission demands

8.4.3 Engineering Test Equipment

The Contractor shall maintain inventory and provide check-in and check-out services for engineering test equipment. Example test equipment includes:

- 1) Multi-meters
- 2) Test equipment
- 3) Flight test data recorders
- 4) Test cables, connectors, probes
- 5) Data buss analyzers
- 6) Computer equipment
- 7) Cameras

These items shall fall under the guidelines/processes of the Contractors tool control program.

8.5 Supplementary Engineering Support Services

When requested by the CO or COR, the Contractor shall provide supplementary engineering support services. These services shall support surges in engineering workload or provide supplementary support for projects requiring unique engineering or support specialties. Example support services are listed in SOW Subsections 8.5.1 through 8.5.9 below.

8.5.1 Structural Analysis

The Contractor shall provide structural analysis services to supplement the analysis requirements listed in SOW Subsection 8.3.1. Structural analyses shall be prepared and documented per AOD Engineering Document #8594001, *Preparation of Stress Analysis Reports*. In addition to the requirements listed in SOW Subsection 8.3.1, the structural analysis service provider shall provide the following analysis support:

- 1) Non-linear analysis (e.g. buckling/stability)
- 2) Vibration analysis
- 3) Composites analysis
- 4) Pressure vessel analysis

8.5.2 Aerodynamic Analysis

The Contractor shall provide aerodynamic analysis services to support aircraft and payload development, repairs, or upgrades. Example aerodynamic analysis tasks include:

- 1) Perform assessments of the aeronautical impacts of aircraft alterations on aircraft stability, control, and performance.
- 2) Perform assessments of aerodynamic loading on aircraft structures and flight controls.
- 3) Perform aerodynamic assessment of payload installations.
- 4) Perform flutter analysis.

8.5.3 Materials Engineering & Testing

The Contractor shall provide materials engineering and testing services. Example materials engineering and testing tasks include:

- 1) Root cause analysis of component failures due to fatigue, corrosion, wear, overloading, or other failure modes.
- 2) Recommendations for materials selection based on aircraft or ground support equipment design or repairs.
- 3) Mechanical testing. Test lab shall be accredited by the American Association for Laboratory Accreditation (A2LA) for testing aerospace grade materials.

8.5.4 Software Engineering

The Contractor shall provide software engineering services to support aircraft, payload, and ground support equipment development, repairs, and upgrades. When requested by NASA, the Contractor shall follow NPR 7150.2A *NASA Software Engineering Requirements*. Example software engineering tasks include:

- 1) Data recorder programming and data post-processing (e.g. Government provided equipment: Ballard Technology data recorders, Ballard CoPilot analysis software, Aeroflex Datatrac, reduced gravity accelerometer data post-processing).
- 2) Line Replaceable Unit (LRU) software development or modification (e.g. Government provided equipment: in-house designed T-38 combined electronics unit).
- 3) Avionics special test equipment software development or modification (e.g. Government provided equipment: in-house designed T-38 combined electronics unit special test equipment).
- 4) Software programming support. Example programming languages may include: C++, Java, SQL, and Microsoft .NET framework.
- 5) Simulation software applications (e.g. Spice, MATLAB, Mathematica, Simulink).
- 6) Macro generation for Microsoft products.

8.5.5 Quality Engineering

The Contractor shall provide quality engineering services to support aircraft, engine, payload, and ground support equipment development, repairs, and upgrades. Example quality engineering tasks include:

- 1) Ensure, design, fabrication, modification/integration instructions (e.g. EWOs), and inspection processes satisfy NASA, FAA, and other statutory requirements as applicable
- 2) Review drawings to ensure proper process callouts (e.g. heat treat, weld inspection, coatings, plating, electrical fabrication requirements, etc.)
- 3) Identify critical components and corresponding inspection requirements
- 4) Perform root cause analyses and develop corrective actions
- 5) Perform Failure Modes and Effects Analysis (FMEA)
- 6) Perform trend analysis
- 7) Coordinate quality and inspection processes for components fabricated via subcontract (e.g. dimensional inspection, weld inspection)
- 8) Provides inspection skill training

8.5.6 Engineering Data Management System Administration

The Contractor shall provide administration services for the Government provided engineering electronic data management system by the end of contract phase-in period. The Contractor shall:

- 1) Provide a database administrator with expertise on the day-to-day use of the existing BlueCielo Meridian Enterprise²⁹ drawing and data management system (e.g. drawing number assignment, check-in and check-out procedures, database permissions, and drawing release). The database administrator shall serve as the single point-of-contact for all engineering electronic database management day-to-day usage issues.
- 2) Support NASA civil servant CAD system installation and maintenance when requested by NASA.
- 3) Receive approval for all changes or upgrades to the CAD system software or drawing standards by the AOD Engineering Branch Chief.

8.5.7 Engineering Logistics Liaison

The Contractor shall provide engineering logistics liaison services. The logistics liaison shall serve as an interface between the engineering group and the Contractor logistics group and shall reside in the AOD engineering branch. Example engineering logistics tasks include:

- 1) Supporting NASA engineering team members to review bill of materials on engineering drawings for accuracy and completeness.
- 2) Generating parts lists based on Bill of Materials or via engineering request.
- 3) Generating procurement requests to the Contractor logistics group.
- 4) Tracking part status working with the Contractor logistics group to ensure timely part arrival.
- 5) Providing delivery status reports by project to engineering as requested.
- 6) Identifying delivery issues and develop plan of action to resolve.
- 7) Coordinating the build-up of aircraft upgrade and payload integration kits.

²⁹ NASA may replace the existing BlueCielo Meridian Enterprise system with a new Government provided engineering database management system during the contract period of performance. If this change does occur, NASA will provide training for the Contractor database administrator on the new system.

8.5.8 Engineering Technical Writing Liaison

The Contractor shall provide engineering technical writing liaison services. The technical writing liaison shall serve as an interface between the engineering group and the AOD documentation group and shall reside in the AOD engineering branch. Documentation development and revisions shall be in accordance with AOD 34100, *Maintenance Manual*. Example technical writing tasks include:

- 1) Review and provide input for technical order (T.O.) revisions based on engineering repairs, upgrades, or revisions (e.g. AOD Form 21 generation support per AOD 34100, *Maintenance Manual*).
- 2) Provide input for flight manual revisions based on engineering upgrades or revisions.
- 3) Support the development of engineering work instructions or revisions.
- 4) Engineering report or documentation generation support.

8.5.9 Aviation Safety Engineer

When requested by the Government, the Contractor shall provide an aviation safety engineer. The aviation safety engineer shall:

- 1) Act as the primary expert in mishap and close call investigations.
- 2) Observe and review ongoing flight and ground operations to ensure compliance with established procedures and safety guidelines, and make recommendations to the NASA Chief Aviation Safety Officer (CASO) and NASA Aviation Safety Officer (ASO), as necessary, concerning any safety issues.
- 3) Maintain a high level of knowledge in areas of aviation safety, aircraft engineering, and maintenance safety to evaluate critical issues related to safe operations of JSC aircraft.

Example duties include:

- 1) Assist the NASA Aviation Safety Office in maintaining the NASA Aircraft Anomaly Reporting System (NAARS) for JSC. Coordinate NAARS routine anomaly investigations.
- 2) Review recommendations, as required, to mitigate identified aviation safety issues.
- 3) Assist in mishap investigations as assigned.
- 4) Maintain currency with mishap investigation techniques and tools.
- 5) If requested by NASA, represent the NASA Aviation Safety Office during Flight Readiness Reviews, Test Readiness Reviews, Payload Readiness Reviews, Operational Readiness Reviews, and preliminary, critical, or final engineering design reviews.
- 6) Assist in the coordination of quarterly Aviation Safety Meeting (ASM) schedules and agendas with the Astronaut Office T-38 Safety Representative. If requested by NASA, assist the NASA ASO in the hosting of ASMs.
- 7) Serve as the document custodian for JW1 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*, and AOD 33887, *Aviation Safety Program Plan*. Coordinate periodic document reviews and update documents as required.
- 8) Assist in the accomplishment of monthly facility inspections as assigned to identify hazards and recommend upgrades to improve safety and health.

Assist in the coordination of annual AOD Safety and Health Day events and in the organization and execution of AOD Safety Stand-downs as required.

8.5.10 FAA Designated Engineering Representative Support

The Contractor shall provide FAA appointed Designated Engineering Representative (DER) services in the appropriate engineering discipline when required for repairs or alterations on FAA type-certificated aircraft or per NASA request.

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L8.0 Engineering – LaRC Center Unique

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9.0 Logistics

9.1 General Requirements

The Contractor shall provide and be responsible for logistics support services for the locations listed in the SOW. This includes inventory management, property control, cataloging, acquisition, shipping and receiving, courier services, and other logistics functions. The Contractor shall utilize the NASA Aircraft Management Information System (NAMIS) in accordance with this SOW for all functional areas and processes required to support logistics. More information on the functional areas and logistics processes supported by NAMIS can be found in AOD 33862, *Volume IV NAMIS Requirements – Aircraft Logistics System Level 5 Requirements*.³⁰

9.1.1 Deliverables – Logistics

The Contractor shall provide the logistics deliverables listed in Table 9-1.

Table 9-1: Data Requirement Description - Logistics³¹

Data Requirement List (DRL) Item No.	DRD Title
DRD-L01	Reports Required for Logistics
DRD-L02	Reserved
DRD-L03	Government Property Management Plan

9.1.2 Support Outside Normal Work Hours

The Contractor shall:

- 1) Assign an on-call support person in accordance with 5 CFR Section 551.431 outside the normal work hours.
- 2) Support person shall arrive at EFD within 2-hours of initial request for assistance.

³⁰ AOD tracks over 50,000 line items in the NAMIS parts catalog for supply. The aircraft logistics support function generates in excess of 160,000 requisitions, issue, receive, and return transactions per year, with a significantly higher number of system inquiries. Approximately 60 percent of the total number of parts is obtained from DoD sources. The Contractor obtains the remainder via local purchase. NAMIS interfaces to the NASA Integrated Enterprise Management Program (IEMP) System for financial accountability, the Defense Automatic Addressing System Office (DAASO) Automated Message Exchange System (DAMES) for requisitioning spares through DoD, and an interface with the Air Force's D043 master parts catalog. In addition, there is an interface between NAMIS and the Contractor's financial accounting system.

³¹ Refer to contract Section J, Appendix J1 for DRD requirements.

9.2 Inventory Management

The Contractor shall provide the Inventory Management services listed below:

- 1) Material warehousing
- 2) Stock control/replenishment
- 3) Reverse posting of supply asset deliveries
- 4) Stock rotation
- 5) Supply issue points
- 6) Physical inventories
- 7) Wall-to-wall inventories
- 8) Spares
- 9) Contract transition inventories
- 10) Inquiries
- 11) Material issue processing to include parts issue counter
- 12) Bench stock management and processing
- 13) Shop stock management and processing
- 14) Shelf-life management
- 15) Material/asset turn-in processing (DIFM)
- 16) Awaiting Parts Disposition (AWP)
- 17) Kitting
 - a. Project kits
 - b. Flyaway (deployment) kits
 - c. Aircraft change directive kits
- 18) Excess and Disposal

9.2.1 Warehouse Safety and Health

The Contractor shall maintain warehouse safety and health in accordance with processes contained in JPR 1700.1, *Safety and Health Handbook*.

9.2.2 Inquiries

The Contractor shall respond to inquiries for information such as part number verification, asset availability, inventory count of an individual item, part number/serial number searches, Government industry data exchange program (GIDEP) alert research and requests to physically view material within two (2) hours from initial request during normal work hours listed in SOW Subsection 4.1.4.

9.2.3 Awaiting Parts (AWP) Disposition

The Contractor shall accomplish the following tasks if a DoD unserviceable end-item has been in an AWP status for sixty (60) days.

- 1) Contact the appropriate DoD Logistics Item Manager responsible for the piece parts or serviceable repairable unit (SRU) to get the most current status on the open requisition(s).
- 2) If delivery of the bits and pieces or SRU cannot be guaranteed within thirty (30) days, the Logistics Manager will contact the appropriate NASA Manager and request disposition of the end-item.

9.2.4 Excess and Disposal

9.2.4.1 Excess and Disposal of Government Property

The Contractor shall:

- 1) Utilize the DoD Customer Asset Report (FTE) and Reply to Customer Asset Report (FTR) processes contained in NAMIS to report DoD excess supply stock and equipment requiring disposal prior to utilizing NASA procedures contained in JWI 4300.1, *JSC Instructions for Excess and Disposal of Government Property*.
- 2) Ensure products dispositioned for scrap are conspicuously and permanently marked, or positively controlled, until physically rendered unusable in accordance with SAE AS9110, *Aerospace Standard, Quality Maintenance Systems – Aerospace – Requirements for Maintenance Organization*.

9.2.4.2 Handling and Disposal of Lithium Cells/Batteries

The Contractor shall receive and handle all lithium cells and batteries in accordance with the processes contained in JPR 8550.1, *JSC Environmental Compliance Procedural Requirements*.

9.3 Property Control

9.3.1 Management of Controlled Equipment

The Contractor shall manage sensitive, controlled and functional property assigned to JSC and managed through the Property, Plant and Equipment (PP&E) System in accordance with JWI 4200.1, *Management of Controlled Equipment*.

9.3.2 Government Property

The Contractor shall manage, inventory, control, use, preserve, protect, repair, and maintain Government property in its possession in accordance with Federal Acquisition Regulation (FAR) Clause 52.245-1, *Government Property* and NPR 4100.1, *NASA Materials Inventory Management Manual*. The Contractor shall prepare NASA Form 598, *Property Survey Report*, for any lost, damaged, destroyed, or stolen Government property in accordance with NPR 4200.1; *NASA Equipment Management Procedural Requirements*.

9.3.3 Control of Customer-Supplied Products

The Contractor shall control customer supplied products in accordance with AOD 33948, *Control of Customer-Supplied Products*.

9.3.4 Repairable Parts Center (RPC)

The Contractor shall coordinate movement of parts from Logistics to the backshops to reduce Logistics short-falls that could have a negative impact on operational support caused by backshop/logistics support. Movement of these parts support workload priorities as established by Production Control for all repairs, upgrades, test and checks and other support items. The Contractor shall:

- 1) Track repairable assets.
- 2) Maintain a due-in from maintenance (DIFM) system to include a repair processing center, which shall track all repairable assets from issue to return to supply.
- 3) Verify document and serial numbers, when applicable, for issued assets, transportation, and tracking of assets while in the repair cycle.

9.4 Cataloging

The Contractor shall provide the cataloging services listed below:

- 1) Classification of parts
- 2) Categorizing parts
- 3) Tagging and labeling parts
- 4) Grouping parts
- 5) Environmental control requirements

9.5 Acquisition

9.5.1 General

The Contractor shall use NAMIS to initiate, create, track, reconcile and archive all purchase requests. The Contractor shall provide the acquisition services listed below:

- 1) Subcontracts
- 2) Purchasing
- 3) Requisition
 - a. Public use aircraft
 - b. Certificated aircraft
 - c. NASA configuration items
 - d. Special Program Requests
 - e. Demand Data Entries
- 4) Warranty Program
- 5) Material Receipt Processing
 - a. Material receiving
 - b. Pilferable item security
 - c. Verification of Purchased Products
 - i. Supply Discrepancy Reporting (SDR) Program
 1. DOD Parts
 2. Commercial Parts
 - d. Functional checks
 - e. Hazardous materials
 - i. Chemicals
 - ii. Explosives

9.5.2 Expedited Sub-Contracting

If requested by NASA, the Contractor shall obtain services or property on an expedited basis that requires the placement of a sub-contract/purchase order. The Contractor shall notify NASA on the status of the request within three (3) working days. Special attention should be paid to obtaining the appropriate Rights in Data, when requested by NASA. Refer to SOW Subsection 9.5.5 for warranty information on sub-contracts.

9.5.3 Local Purchase

The Contractor shall:

- 1) Utilize AOD Form 1307, *Purchase Request Worksheet*, for approval to purchase equipment, supplies and services, including fabrication, training, and sub-contracting to support the AOD mission. Refer to AOD 33978, *Purchase Request*, for additional guidance.
- 2) Obtain approval from CO, COR, or designee prior to ordering any new item containing a hazardous constituent.
- 3) Obtain prior approval from the CO, COR, or designee for all commercial purchases greater than \$10,000.
- 4) Obtain CO approval on all purchase orders or sub-contracts greater than \$100,000.
- 5) Utilize the NASA Defense Priority and Allocation System rating of nine (9) for all commercial purchases.

9.5.4 DoD Requisitions

The Contractor shall:

- 1) Ensure funding is available for DoD Requisitions.
- 2) Transmit requirements to the Defense Automated Message Exchange System (DAMES) on a daily basis.
- 3) Ensure that NAMIS purchase order amounts are updated based on DAMES response showing the unit price for items that have been shipped.
- 4) Ensure retro-grade carcasses are returned within 30-days for each Expendability, Recoverability, Reparability Category (ERRC) "T" item requisitioned.
- 5) Reconcile DoD invoices, Military Standard Billing System (MILSBILLS) with actual orders and receipts in NAMIS. Utilize assistance from the NASA Disbursement Office as required.
- 6) Provide a five-year requirements data exchange list (RDEL) for all ERRC "T" items in accordance with AFMCMAN 23-1, Chapter 27, *Requirements for Secondary Items*.

9.5.5 Warranty Program

The Contractor shall:

- 1) Provide any benefits to NASA that would accrue or be due from commercial warranties received with the purchase and repair of materials, parts, and equipment under this contract.
- 2) Ensure all sub-contracts/purchase orders contain warranties covering design and manufacturing requirements, defects in materials and workmanship, and essential performance requirements.

9.5.6 Verification of Purchased Products

The Contractor shall support inspection or other activities necessary for ensuring that purchased products meet specified purchase requirements in accordance with SAE AS9110, *Aerospace Standard, Quality Maintenance System – Aerospace – Requirements for Maintenance Organization*.

9.5.7 Supply Discrepancy Reporting (SDR) Program

The Contractor shall report parts received from DoD and Commercial sources that are identified as defective or suspect as follows:

For DoD Parts:

The Contractor shall:

- 1) Report any part received from DoD that is identified as defective or suspect via the DoD Defense Automatic Addressing System Center (DAASC), WEBBASED Supply Discrepancy Reporting System (WEBSDR)³²
- 2) Segregate parts reported under the WEBSDR from normal stock pending disposition from DoD sources.
- 3) Conduct follow-up action on any SDR within thirty (30) calendar days from initial report submission.

For Commercial Parts:

The Contractor shall:

- 1) Report suspect parts under the Suspect Unapproved Parts (SUP) Program using FAA Form 8120-11, *Suspected Unapproved Parts Report*.

³² Access to WEBSDR may be obtained by completing an online system access request (SAR) from the DAASC website: <https://www.daas.dla.mil>.

9.5.8 Material Processing Timelines

The Contractor shall:

- 1) Process material requests for items in stock within two (2) hours of initial request.
- 2) Process material request for items not in stock by close of business the day after the item is received in supply, unless the material falls under the priority receipt definition.
- 3) Process priority receipts on the same day the item is received. Priority receipts are defined as
 - a. Hazardous Materials
 - b. Communications security (COMSEC)
 - c. Medical items or drugs
 - d. Work stoppage items
 - e. Receipts requiring special handling
- 4) Process routine receipts (items that do not meet priority receipt definition) no later than the second (2nd) work day after receipt of item.

9.6 Pyrotechnics Logistics Management

The Contractor shall:

- 1) Follow the provisions outlined in JPD 4500.1F, *Pyrotechnics – Logistics Management*, and JPR1700.1, *JSC Safety and Health Handbook, Explosive and Propellant Safety*.
- 2) Forecast pyrotechnic device replacement requirements for cartridge actuated devices (CAD) and propellant actuated devices (PAD) and place them on order to optimize quantity cost vs. shelf life (refer to USAF Technical Order 00-20-9, *Forecasting Replacement Requirements For Selected Calendar and Hourly Time Change Items*, for assistance).
- 3) Dispose of explosive devices in accordance with USAF T.O. 11A-1-42, *General Instructions for Disposal of Conventional Munitions* and USAF T.O. 11A-1-60, *Inspection of Reusable Munitions Containers and Scrap Material Generated from Items Exposed to or Containing Explosives*.
- 4) Immediately notify NASA Quality of any damaged or suspect pyrotechnic.
- 5) Ship and transport explosives in accordance with Code of Federal Regulations (CFR) 49, *Hazardous Material Regulation* and Air Force Manual 91-201 (AFMAN 91-201), *Explosive Safety Standards*.

9.7 Shipping and Receiving

The Contractor shall provide and support Shipping and Receiving services. Example services include:

- 1) Standard handling requirements
- 2) Special handling requirements
 - a. Over-size deliveries
 - b. Rigging and heavy hauling support
 - c. Escorts
 - d. Premium transportation services
 - e. NASA aircraft transportation

9.7.1 Export Compliance

The Contractor shall ship material OCONUS in accordance with all applicable laws and regulations to include export control in accordance with JWI 2190.1, *JSC Export Compliance*.

9.7.2 Identification, Handling, Storage, Packaging, Preservation and Delivery

The Contractor shall identify, handle, store, package, preserve, deliver, and ship products in accordance with JPR 1281.15, *Identification, Handling, Storage, Packaging, Preservation and Delivery* and USAF T.O. 00-85B-3, *How to Package Air Force Spares*.

9.7.3 Preparation and Processing of JSC Form 290, JSC Shipping Document

When requested by NASA, the Contractor shall coordinate Government bill of lading (GBL) for property that will be transported within CONUS or OCONUS (exported) to include commercial bill of lading (CBL) in accordance with JWI 6050.1, *Procedures for Processing Shipments From JSC*.

9.7.4 Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

The Contractor shall:

- 1) Use reusable containers when practical for all items that require periodic shipment to and return from repair activities and where adequate provisions to control the containers make reuse economical in accordance with NPR 6000.1H, *Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.
- 2) Reuse packaging material to the maximum extent practicable in accordance with NPR 6000.1H, *Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.

9.7.5 Hazardous Material Shipments

The Contractor shall ensure that all shipments containing hazardous materials are packaged, packed, marked, labeled, and documented as appropriate, in accordance with the processes contained in:

- 1) Department of Transportation (DOT) Hazardous Materials Regulations in Title 49 CFR
- 2) International Civil Aviation Organizations (ICAO) Technical Instruction for the Safe Transportation of Dangerous Goods
- 3) International Maritime Organizations (IMO) Dangerous Goods Code
- 4) International Air Transport Association (IATA) Dangerous Goods Regulation

9.7.6 Reporting and Adjusting Discrepancies in Government Shipments

The Contractor shall ensure shipping discrepancies are resolved and freight claims are processed in accordance with 41 CFR 101-26.803-3, *Reporting of Discrepancies in Transportation, Shipments, Material or Billings*.

9.7.7 Shipments on NASA Aircraft

All cargo movements onboard NASA aircraft shall be coordinated in advance with the NASA Operations Duty Officer to ensure cargo meets all Federal requirements, particularly in the transportation of hazardous materials. Hazardous cargo as defined in 49 CFR 171.8, *General Information, Regulations and Definitions*, shall not be transported on NASA mission management aircraft.

9.7.8 J-85 Shipping

The Contractor shall ship NASA J-85 engines in accordance with NASA J-85 Shipping Instructions contained in T.O. 1T-38A-2-6.

9.8 Courier and Delivery Services

The Contractor shall supply courier and delivery services to pick up and deliver documents, packages, parts, tools, equipment, and other items as requested.

9.9 Deployment Support

Upon Government request, the Contractor shall provide logistics personnel at deployed locations.

L9.0 Logistics – LaRC Center Unique

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10.0 Quality

10.1 General Requirements

The Government will have overall authority and will provide priorities and direction for all quality related activities performed by the Contractor. The Contractor shall:

- 1) Comply with the JSC Quality Management System (QMS) for the products and services provided to the Government under this contract.
- 2) Comply with process control, corrective actions, and continual improvement in accordance with the following:
 - a. JPR 1280.2 *Quality Manual*
 - b. JPR 1281.9 *Process Control*
 - c. JPR 1281.14 *Corrective and Preventive Actions, and Continual Improvement*
- 3) Perform inspection activities during manufacturing, testing, maintenance, and operations to reduce the overall risk to safety, cost, schedule, and mission success.
- 4) Provide inspectors that are trained in quality assurance and engineering methods for purchasing, maintenance, testing, inspection, audits, and surveillance.
- 5) Identify characteristics requiring inspection points, sampling plans, or special process inspection needs [e.g., Non-Destructive Inspection (NDI)], based on history, criticality, and risk.
- 6) Provide the quality deliverables listed in Table 10-1:

Table 10-1: Data Requirement Description - Quality³³

Data Requirement List (DRL) Item No.	DRD Title
DRD-Q01	Government Industry Data Exchange Program (GIDEP) and NASA Advisory Problem Data Sharing and Utilization Program Documentation and Reporting

10.2 Non-Conformances

The Contractor shall take corrective action for all non-conformances (not meeting contract requirements) identified during Government/Contractor surveillance/audits and provide corrective actions to the NASA CO and COR in accordance with AOD 34100, *Maintenance Manual*. All data will be maintained in Government provided data bases.

³³ Refer to Section J, Appendix J1 for DRD requirements.

10.3 Corrective and Preventative Action

The Contractor shall ensure that corrective and preventative actions comply with the JSC QMS.

10.4 Procurement Quality Assurance

The Contractor shall conduct contract surveillance throughout the procurement/subcontracting process in accordance with NPR 8735.2, *Management of Government Safety and Mission Assurance Surveillance Functions for NASA Contracts*. The Contractor shall document their surveillance processes in the Contractor's Quality Management System (QMS).

10.5 Deployment Support

When requested by NASA, the Contractor shall provide quality control support for aircraft deployments per SOW Subsection 4.6.2.

10.6 Deficiency Reporting

The Contractor shall support deficiency reporting (DR) in accordance with AOD 34100, *Maintenance Manual*.

L10.0 Quality Control – LaRC Center Unique

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11.0 Safety

11.1 General Requirements

11.1.1 Contractor Safety and Health Program

The Contractor shall develop, maintain, and execute a safety and health program in accordance with NASA JPR 1700.1, *JSC Safety and Health Handbook*.

11.1.2 NASA Safety Programs

The Contractor shall support safety programs in accordance with JSC JPR 1700.1, *JSC Safety and Health Handbook*, USAF T.O. 33B-1-1, *Nondestructive Inspection Methods, Basic Theory* and Air Force Manual (AFMAN) 48-125, *Dosimetry Program*, JPD 1040.2, *JSC Emergency Preparedness Program*. Examples include:

1. Voluntary Protection Program (VPP) – Ellington Field is a VPP Star Site
2. Confined Space Entry Program
3. Hazardous Materials and Hazardous Waste Management Program
4. Radiation Safety Program
5. Facility Emergency Preparedness Program

The Contractor shall provide the safety deliverables listed in Table 11-1.

Table 11-1: Data Requirement Description - Safety³⁴

Data Requirement List (DRL) Item No.	DRD Title
DRD-S01	Lessons Learned Program Plan and Lessons Learned
DRD-S02	Safety and Health Plan
DRD-S03	Safety and Health Program Self Evaluation
DRD-S04	Monthly Safety and Health Metrics

11.1.3 Workplace Health and Safety

The Contractor shall:

- 1) Comply with Occupational and Health (OSHA) (Public Law 91-596) Guidance, USAF technical orders (T.O.), and other DoD and aircraft manufacturers prescribed processes/procedures to ensure the safety of their personnel.
- 2) Resolve safety and health issues as they arise.

³⁴ Refer to Section J, Appendix J1 for DRD requirements.

11.1.4 Deployment Support

When requested by NASA, the Contractor shall provide safety support for aircraft deployments. Support may include investigation and/or root cause analysis of a safety reported close call, mishap or injury.

11.2 Hazards

11.2.1 Job Hazard Analysis (JHA)

When written directives do not identify hazards for tasks being performed, the Contractor, with assistance from NASA and Contractor's safety offices, shall complete a job hazard analysis (JHA). Procedures for JHA's are contained in JPR 1700.1, *JSC Safety and Health Handbook* and ASO WI 33901, *Job Hazard Analysis*.

11.2.2 Hazardous Materials (HAZMAT)

The Contractor shall follow established guidelines for handling hazardous materials in accordance with JSC JPR 1700.1, *JSC Safety and Health Handbook*.

11.3 Mishap and Incident Response

11.3.1 Aircraft Mishap Interim Response Program

The Contractor shall:

- 1) Support NASA in responding to aircraft mishaps, injuries, fuel spills, environmental contamination, and weather damage to support JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*
- 2) Provide the NASA COR and CO with an up-to-date list of qualified response team members

11.3.2 Mishap and Close Call Reporting

The Contractor shall:

- 1) Report mishaps and close calls (flight and ground) in accordance with JPR 1700.1, *JSC Safety and Health Handbook*, NPR 7900.3, *Aircraft Operations Management Manual*, and AOD 34100, *Maintenance Manual*.
- 2) Immediately notify maintenance control and the NASA Operations Duty Officer of mishaps regardless of date and time.
- 3) Notify the Contracting Officer and Contracting Officer Representative of mishaps within 48 hours
- 4) Coordinate close call reporting with the NASA Safety Office

- 5) Ensure all equipment (aircraft, engines, and support equipment) involved in the close call or mishap is impounded in accordance with AOD 34100, *Maintenance Manual* to ensure a thorough investigation into the root and causal factors can be conducted without altering the mishap scene.

11.3.3 Mishap and Close Call Investigation

The Contractor shall:

- 1) Support mishap investigations when requested by NASA.
- 2) Ensure mishap investigation support is in accordance with JPR 1700.1, *JSC Safety and Health Handbook* and NPR 7900.3, *Aircraft Operations Management Manual*.
- 3) Ensure personnel assigned to investigate mishaps are trained per SOW Subsection 4.5.4.6.

11.3.4 Mishap Interim Response

The Contractor shall support mishap interim responses in accordance with JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*.

11.3.5 Crash Trailer Management

The Contractor shall maintain NASA's aircraft emergency response trailer and its equipment located at Ellington Field (EFD). This includes:

- 1) Inspect the crash trailer every one-hundred-eighty (180) days in accordance with CC-WD-G6; *Support Equipment Inspection and Documentation Program*.
- 2) Conduct a wall-to-wall inventory every three-hundred-sixty-five (365) days of the crash trailer contents listed in JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*. The inventory will include inflation of all aircraft lift bags in accordance with established technical data/OEM maintenance manuals.
- 3) Track and document inspections in the NAMIS database.
- 4) Ensure that a sufficient number of personnel are familiar with the technical data maintained in the crash trailer in accordance with JWI 1040.27, *JSC Emergency Preparedness Plan, Appendix 5 – JSC Aircraft Mishap Plan*, to support emergency response in the event of an aircraft mishap.
- 5) Maintain an Air Force Technical Order (AFTO) Form 244; Industrial/Support Equipment Record, for the trailer.

11.3.6 Facility Disaster Recovery and Restoration

The Contractor shall assist the Government in disaster recovery and restoration of facilities in accordance with JPR 1040.4, *Emergency Preparedness Plan*.

L11.0 Safety – LaRC Center Unique

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12.0 Government – Industry Partnerships

The Flight Operations Directorate (FOD) is interested in encouraging creative government – industry partnerships that could help improve and expand NASA’s mission and capabilities. To facilitate this, NASA may permit the Contractor to utilize NASA’s facilities, systems and technical capabilities (e.g. skills, tools) for purposes other than contract performance, provided that the Contractor demonstrates and documents sufficient mutual benefit. The use of such property and capabilities shall be subject to the terms and conditions of this Contract and any related Space Act Agreements or other applicable mechanisms. Utilization of FOD systems and technical support services shall be in accordance with Clause TBD.XX, *Non-Government Use of FOD Facilities*. All effort associated with these activities shall be at the Contractor’s expense and not billable to the Government under this contract. All partnering requests shall be submitted to the CO.